

MOTOR AGE

Vol. XXX
No. 6

CHICAGO, AUGUST 10, 1916

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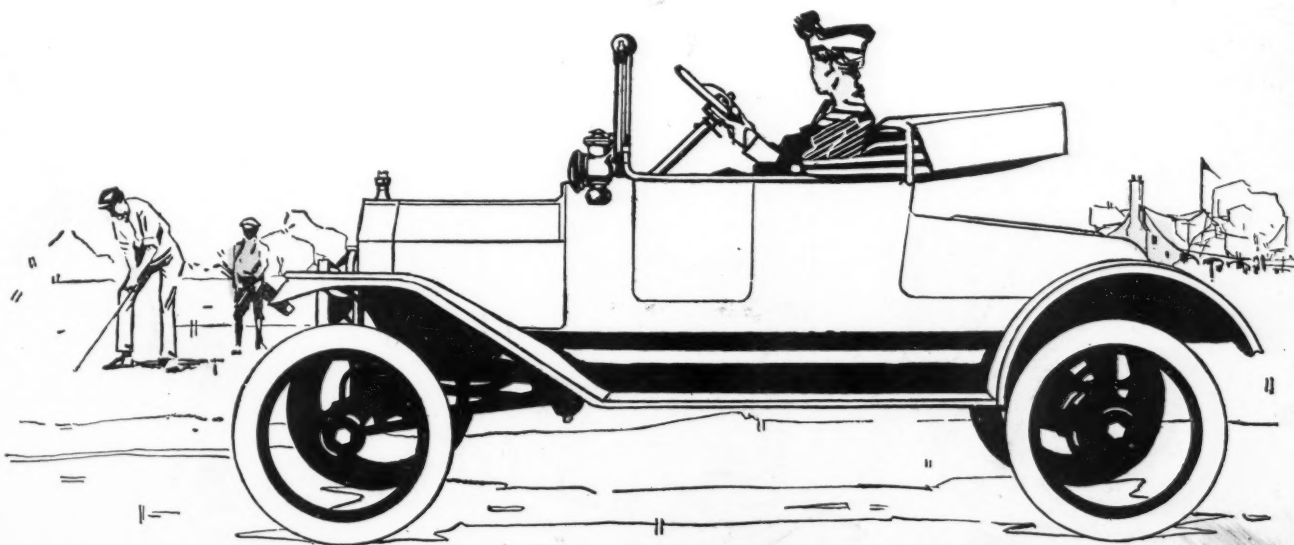


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MOTOR AGE



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ANNOUNCEMENTS

Next week's issue will contain a complete account of the Pike's Peak hill-climbing contests which will be held August 10, 11 and 12. There will be a concluding installment from the Motor Age correspondent on the European war front dealing with the education of French drivers.

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MOTOR AGE

How France Makes Military Chauffeurs

by W.F. Bradley

Part I—Training War-Truck Drivers

IF the military authorities of France had possessed prophetic vision 2 years ago, it is probable that they would have picked out every man possessing a Government motor driving license and placed him in a special military motor corps, but it was not given to anybody to foresee the immense development of motor vehicles to warfare, and men were estimated according to their fighting and not according to their motor-driving value.

Thus it has been necessary, while the war is in progress, to train men to handle the trucks, touring cars, ambulances, tractors and other mechanical vehicles employed by the thousands in connection with the armies in the field. Military economy says that the men to be trained as motor truck drivers shall be those standing lowest in the army scale of efficiencies. The healthy young fellow in his twenties is wanted in the firing line; the workman's place is in the shell factories; the young wounded soldier, no longer capable of heavy marching and exposure to all weathers, can be transformed into the expert driver of a fast car. The man who is nearing or who has passed the age of 40, the laborer with no special qualifications, the man of mediocre intelligence, the man who has managed, despite conscription, to reach middle age without having handled a gun—this is the man military economy designates as suitable for licking into shape as a truck driver at the front.

And they want these men urgently. They get them in 15 days, and after only 15 hours' actual driving experience. At the end of that time they are really good

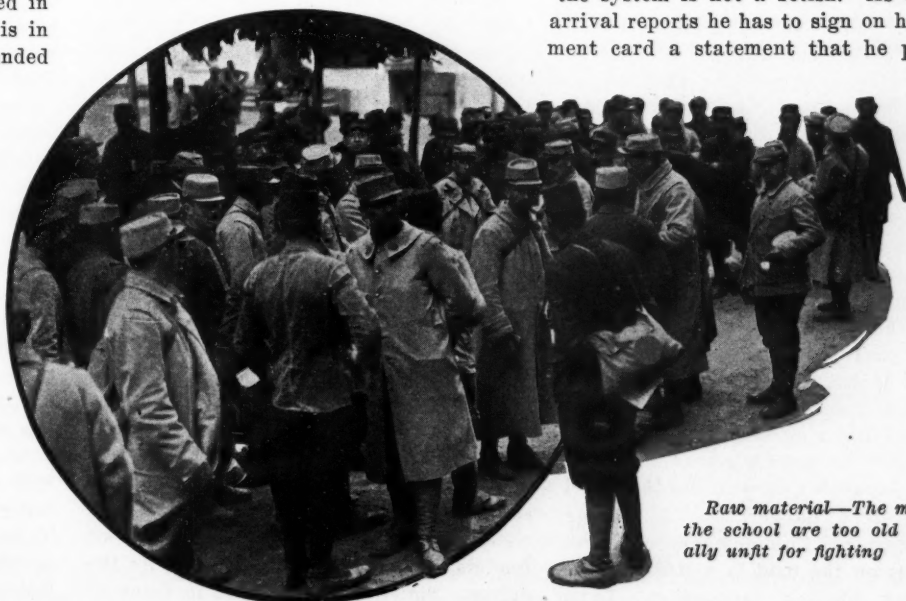
drivers. They are not men you would send out alone with a 90-horsepower semi-racing car; but put them at the wheel of a White, Packard, Pierce, Kelly or any other make of truck, and they will go up to the firing line, over shell-swept roads, with the regularity and correctness of a team of veterans.

Farmhands Become Good Drivers

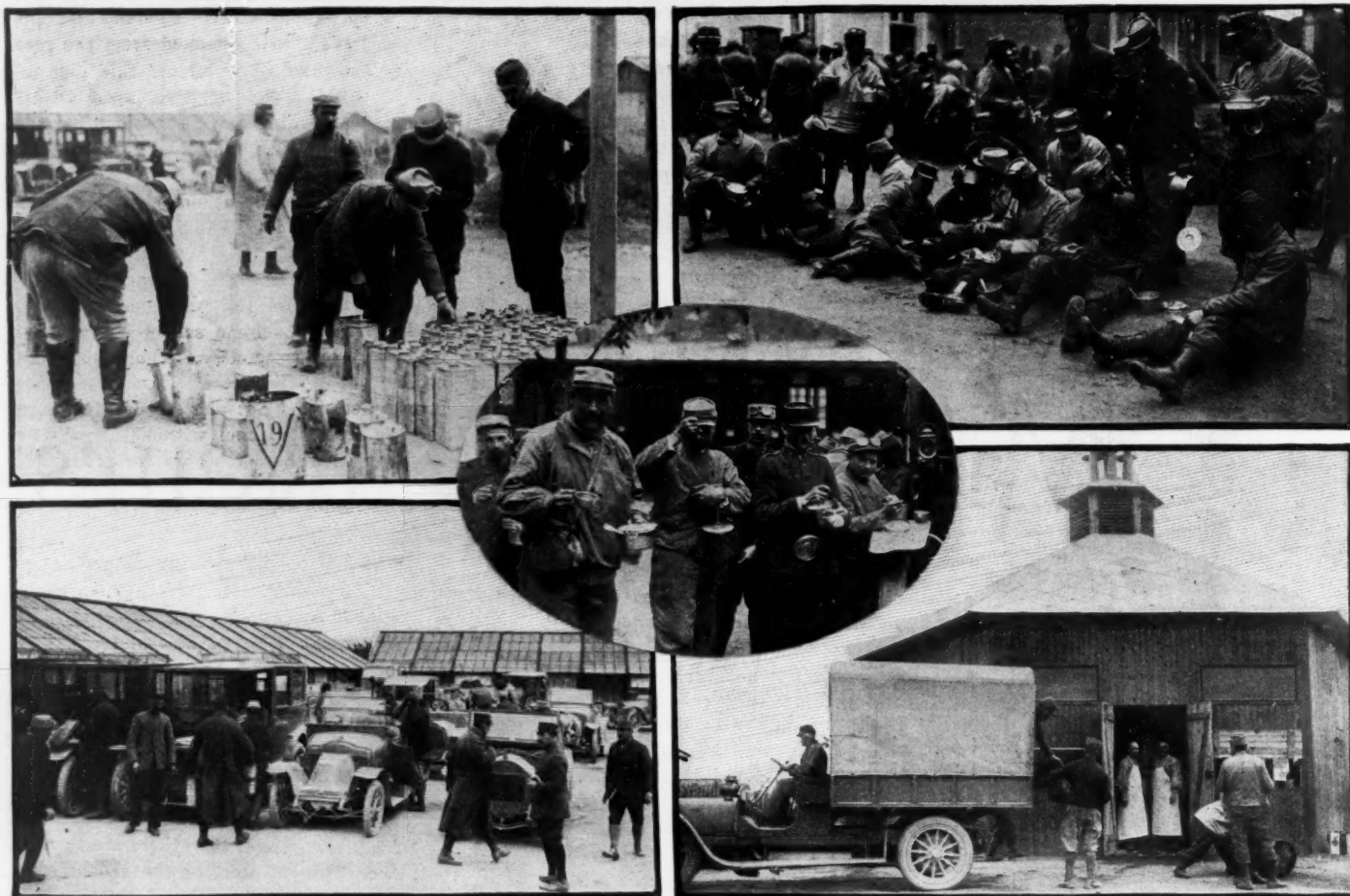
The transformation in those 15 days is marvelous. It must be remembered that France is primarily an agricultural country and that only the elite of its farmers have heard of Henry Ford. The men passed into the truck schools are mostly workers on the land who never have found it a handicap to be unable to differentiate between a steam locomotive and an internal combustion motor, yet it is men such as these who helped to save Verdun and elicited praise from General Joffre for the way in which they carried out their duties.

From their various regimental depots these future drivers are sent to a camp established to provide theoretical instruction and form touring car drivers, but the officers of this school want only the best men for touring cars; the others are turned out, 4 or 5 days later, to the school specially established for the formation of truck drivers. In 4 days you cannot do much with a man who never previously looked under a motor hood, and whose experience with machinery has been limited to a hay chopper. Thus, while it has to be assumed that the men can name the various components of a motor car and know the functions of the different levers and pedals, the officers must handle them as babes in motordom.

The quick results are obtained by a good system intelligently applied, and also by an ever-present willingness on the part of the men. Unlike many military schemes the system is not a fetish. As each new arrival reports he has to sign on his equipment card a statement that he possesses



Raw material—The men sent to the school are too old or physically unfit for fighting



Upper left—Measuring gas and oil for the school training cars. Upper right—Pupils eating dinner in school yard. Oval—Some of the apprentice drivers prefer to eat in the open. Lower left—Apprentice drivers filling the tanks. Lower right—Unloading provisions at the cookhouse door—the house was built by soldiers from American trucks

or does not possess the government driving license, which is delivered only after a practical test. This automatically reveals any man who would prefer the comfort of the school to immediate service at the front.

Trucks Operate in Convoys

The country around the school being of a varied nature, there have been mapped out a series of circuits beginning with a set of straight level roads and ending with hilly routes and hairpin turns on steep gradients. The men are divided up into groups of eight and put aboard a 2-ton truck in charge of a monitor. English trucks are the most commonly used, the makes being Star and Tilling-Stevens, although there are a number of Reo trucks for final instruction, and also some Whites and Pierce-Arrows. The trucks operate in convoys of about fifteen, each convoy in command of an officer, but during the first few days the instruction is individual and it is not expected that the men should operate in unison with others on the road. Eight hours are spent on the road each day and as there are eight men aboard, each one gets an hour's actual driving a day. The instructor never takes the wheel except in case of danger.

It is recognized that any man can hold a motor car on the road in a straight line after a few minutes' instruction. Thus,

from the beginning to the end of the course straight line driving is avoided. At first the men are taught to stop at the signal and at given distances and to go right through the gears. Almost as soon as they have got into top the truck is brought to a standstill and the performance has to be repeated.

When the men take up convoy work, which is generally possible after 2 days' individual instruction, each pupil as he takes the wheel is given an assistant, whose place is on the left-hand step, the instructor being in the middle of the front seat. Standing in this position the assistant is made to realize that he is not alone on the road, and that when he takes the wheel he will have to act in such a way as not to interfere with those ahead and in the rear. When any difficult movement has to be performed, such as turning on a road of moderate width, the assistant gets down and takes charge of the operations. To avoid confusion and to put a stop to any attempt at discussion, the assistant is limited to the use of the five words—left, right, ahead, reverse, stop. The word "gently" is tolerated, although not considered necessary. As an aid to the assistant, the letters representing left and right are painted on the end of the front fenders as left and right are seen by the driver. Standing on the road in front of

his truck, the assistant is obliged to think out the movements and give orders, such as "ahead, right, stop, reverse, left," etc. Naturally the man at the wheel is thinking also, for the feel of the steering wheel and the throb of the motor give a sense of responsibility, but he cannot move until the assistant also has decided what shall be done. If, between them, they bungle the movement, the monitor interferes; further, there is likely to be a discussion, on reaching barracks, which is for the ultimate benefit of the army.

Team Work Hastens Training

Convoy work incites the men to greater effort by reason of the close comparisons it offers. The fifteen trucks are moving along a road at the regulation speed of 10 miles an hour, and at the regulation distance of 25 yards between each vehicle. The shrill blast of a whistle brings them to a stop, the officer's touring car ahead, the Pierce repair shop in the rear. At another signal each vehicle has to turn, so as to stand facing the opposite direction and on the opposite side of the road. On a full width highway this operation can be performed with one use of the reverse, and with a well-trained crew an entire convoy can get round with mathematical precision in less than a minute. But among a set of learners there will be some who will fail to make full use of his lock, who will

stall his motor, or who will back his truck into the ditch. Such a bungler is made to feel as uncomfortable as the only man in a platoon who cannot keep step. The turning movement performed, the assistant drivers stand on the step with the left arm extended. The signal given, they



An open air shave prior to going on leave

move ahead for 100 yards, then begin it all over again. Or the order may be changed, and instead of the entire convoy swinging round simultaneously, they do it progressively, No. 1 first, and the others in order. The next time the order may be to back into a branch road, the first driver to enter having to proceed probably a quarter of a mile on his reverse. Towards the end of the training night-driving is ordered, in convoy formation, without lights on the vehicles and over roads and through villages plunged in complete darkness.

Men Handle Several Makes

As the men may have to handle any make when they go to the front, drivers who have begun on a Star pass to a Tilling and finish their course on a Reo, thus habituating them to different types of controls. Officers in charge of driving schools would prefer unification of controls, but that is an ideal impossible of attainment during the present war. The greatest difficulties are gear changing and the judging of distances. It is not an easy matter to make pupils realize they can change gears without looking at the quadrant. One man who had got as far as the night-driving stage was found striking matches in order to find his gears. Estimates of distance will vary 100 per cent, and it is only by strict attention to this point that bunching or needless straggling of a convoy can be avoided. The placing of an assistant driver on the step helps in this matter, for there he feels himself more a part of the convoy

than when at the wheel with no other view than a tail-board just ahead.

Fifteen days after they enter the school the men go out fully trained; from the school in question the output is — * per day. Of permanent failures there are practically none. Two or 3 per cent of the men have to be put back a few stages, or retained longer than their companions in the convoy formations. Very rarely there appears a pupil who declines to be interested in motors or things mechanical. If the school discipline fails to help him along, the suggestion that there are seats available in the front line trenches never fails to rouse him to activity.

Although in commercial circles the material would be considered the least suitable for shaping into truck drivers, it is found possible to produce super-drivers. The officers are always on the watch for men who have inborn, and hitherto unsuspected, natural ability, and they find them even among pupils who previously have confined their activities to the use of a pick and a shovel. Such men are not turned out at the end of a fortnight, but are retained for a supplementary training as "depanneurs"—a new word in the French language which signifies a "get-you-out-of-the-hole" expert. It would hardly be correct to class these men as mechanics, for their standing in a workshop would not be very high, but they are made to study everything which could possibly prevent a truck functioning properly. Their practical instruction comprises work on the repair-shop trucks, two pupils acting under one expert mechanic. In addition, they are given theoretical instruction at the school and for a short time are placed in the school workshop among skilled men. Before being sent out to strengthen the convoys in the field, the breakdown men are given an individual test, which may be as follows: a truck is left with ignition leads

* Deleted by request of French war office.

mixed up, its jet orifice choked, and one of the drive shafts removed from the rear axle. The man who handled this case reported, at the end of 2 hours, that his motor was running and he would bring the truck home if the repairshop would send him a drive shaft.

Running a motor school in the French army is a more complex problem than the giving of instruction to pupils of varied intelligence. It is hardly necessary to explain that before the war there were no military motor vehicle schools in France, or in any other country. Thus, when the order went out for more and more drivers, it was necessary not only to produce men for the steering wheel without delay, but also to create the machinery for producing those men—and the one had to be done without interfering with the other.

Old Factory Is School

To take this truck-driving school as an example, the officer in charge—in civil life an engineer and public works contractor—was put in possession of an isolated country boot factory which had been abandoned for nearly 20 years. He had a small, a very small, credit to his account with the war department, a staff of reserve officers drawn from various civilian professions,



School officers and W. H. Bradley, Motor Age staff correspondent



French officers in charge of motor driving school. Inverted V on right arm of officer indicates that he has been wounded in active service



Reading from top to bottom the illustrations are: School convoy of about fifteen trucks operating under the directions of officers; green drivers receiving individual instructions; convoy backing into a narrow road as a part of the school "curriculum"; his first day at the wheel—an officer walks beside the truck and corrects mistakes. Note the smooth roads. These are kept in repair by a professional road surveyor



Chauffeur washing an army car in a stream
The method is superior to a hose

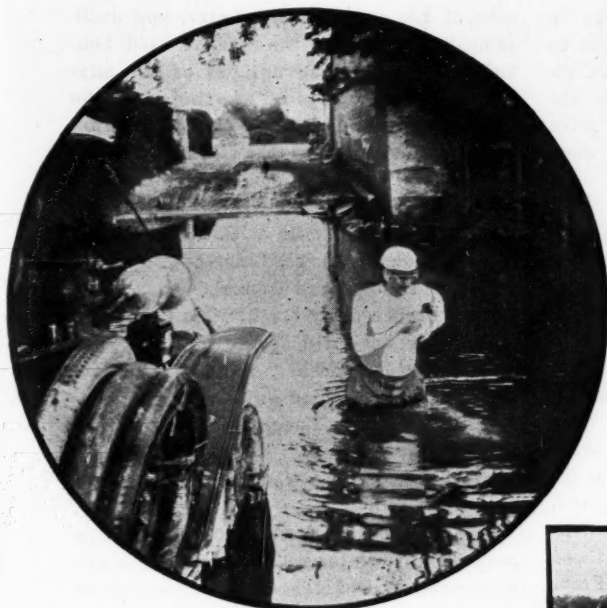
and between 2,000 and 3,000 elderly troops waiting to be initiated into the mysteries of truck driving. That school had to be self-sufficing; practically all of the various things they required they had to make themselves.

The place had no sanitary system; the officers designed one and the men executed it; wooden sheds were wanted for the men; they were produced in the same simple way; there was no mess room for the officers; an extension was built on the sloping ground behind the main offices—and it cost nothing. How this result was obtained is worth noting. American trucks shipped to France are packed in strong wood boxes. As the trucks leave the French port under their own power, they carry the knock-down boxes with them, to be dropped at this school and other similar places as required. This wood had made camp bedsteads, store houses, lockers, offices, etc. There was no artificial lighting at the camp; a gasoline motor and dynamo were installed and a few electricians picked from the ranks ran up the wiring.

Ingenuity Makes Camp Better

At the same time the old water wheel which had not turned for a score of years was rebuilt and made to drive a dynamo providing sufficient current for the whole camp. A stream ran through the grounds, and there was a disused and moss-grown lock. It was cleaned, modified, and made into an excellent swimming pool. Washing accommodation was required. Some rooms by the side of the water-wheel were concreted, water laid on, and a furnace built for providing hot douches. The camp refuse sufficed for the furnace and made unnecessary any allowance for coal.

It was recommended that troops should grow their own vegetables, wherever possible. Immediately gardens were laid out and cultivated by the men in their spare time. When the school was established



After washing his car this military chauffeur performs the same operation on himself

the civil authorities grumbled that the roads would be ruined by 200 or 300 trucks running 8 hours a day. The officer in charge looked through his list of pupils and found a professional road surveyor. This man was picked out, given half a dozen laborers and told to make good all damage as it occurred. To do this, to organize a school out of nothing, to erect machinery capable of producing finished truck drivers at the rate of fifty per day, after only 15 days' training, has occupied exactly 3 months—and during those 3 months the finished article has been coming through with regularity.

Repair Problems Important

The repair problem had to be faced. Two thousand raw recruits can use up a respectable number of gearboxes per week, while the trucks used for general work and the officers' and instructors' cars call for some attention. Regarding the trucks it should be mentioned that they are absolutely standard, double levers and pedals being found unnecessary for instruction purposes. The two English makes have double ignition—by magneto and by battery. When motor repairs have to be carried out the battery ignition is removed. Magneto ignition gives all the security the French army desires, and as much complication as is good for the men.

An engineer-lieutenant was put in charge of the repair department. That is to say he was given a staff of skilled soldier-workmen and introduced to a set of deserted building, four lathes, a drilling machine, a gas engine and a dynamo. He had to erect sleeping accommodations for his men; he had to build a kitchen and arrange for the purchase and cooking of food; there was need of a barber shop and wash-sheds; shafting had to be erected and electric wiring run through, and it all had to be done by the school staff without neglect of the essential work of re-



Reading from top to bottom the illustrations are: School convoy ready to practice a turning movement; his first attempt at turning on the open road—officers watch operation; an entire convoy turning on a French road—the drivers are green; Pierce-Arrow repair shop, a part of the school convoy, and first aid not only to the training school trucks—but for those who study breakdowns especially

pairing trucks. The ingenuity that the war develops helped bring the desired results.

It is the boast of the officers that they have every trade under the sun at their disposal. An electrician is wanted; he is found immediately; a glance through the lists will reveal a smith, an architect, a butcher, an accountant, a lathe hand or a draftsman. Those men who are most useful to a school, such as fitters, turners, forge hands, testers, are retained instead of being sent out for truck driving in the field.

Salary 5 Cents a Day

By intelligent selection a staff of experts is grouped around the officer—men of life-long experience in the motor vehicle industry, engineers of more than local fame, mechanics who have been right through the first 10 years of European road racing. They are soldier-workers at 5 cents a day. Though it may not bring any personal danger, war to these men means sacrifice. The officers know it, and although attentive to the welfare of all their men, the mechanical staffs receive special consideration. The government allowance for food is spent with a view to full value for every cent; the men who prepare the food are professional cooks who, although they may not give all the trimmings of the palatial hotels, at any rate supply the quality. In the French army it is not sufficient for the sergeant

to say the food is right; the officer in charge makes it his personal business to see that the nominal supply is above reproach and also to make it possible for the men to purchase extras at a price which would cause a housewife to weep with envy.

Temporary Organization

The whole of this organization is new and temporary. With the end of the war most of the schools and repairshops will be wiped out of existence, for under peace conditions months will be available where at present days must be considered sufficient. One of the features of this movement is that it will leave France with thousands of men fully conversant with all the uses of the motor car and the internal-combustion motor. These men, too, are not the class previously in touch with the motor vehicle movement, but those farthest removed from the industry. From one center alone —* men have gone into the motor vehicle army. They are most of them men who never looked under a motor car hood before the war broke out and who would not have recognized a carbureter if one had been placed in their hands. When these men go back to the land they will want to use motor cars and gasoline motors where formerly they considered horses and manual labor sufficient. Then there will be a revival in France.

* Deleted by request of French war office.

with 50 per cent benzol. Later, and until immediately before the war, it used benzol only. The disadvantages of the mixture were difficulty in starting and the necessity of cleaning out the combustion chamber more often than with the use of gasoline. The bus company found that their fuel consumption was at the rate of 0.176 gallons per mile with benzol only; 0.180 gallons with gasoline, and 0.2 gallons for alcohol and benzol. In all the annual French army truck trials held prior to the war one-third of the total distance had to be accomplished on an alcohol-benzol mixture, one-third on benzol, and one-third on gasoline. Except for the difficulty in starting from cold the alcohol-benzol mixture was as satisfactory as the other two fuels.

Since the outbreak of the war there has been no use of benzol and alcohol in the motor services of the allied armies, these two fuels being monopolized for the making of explosives.

SYSTEM IN MUNITION PLANTS

Paris, July 25—With a view to some increase of the output of all munition factories, the French artillery and munitions department has issued a circular showing how improvements can be made. These suggested reforms interest the motor industry, for the whole of the motor factories of France are occupied on war material.

It is suggested that the Taylor system should be adopted as extensively as possible. This system is well known to French motor car manufacturers. When first attempts were made to adopt it, a few years ago, it met with opposition from the workers. Arrangements now are being made to place foreign labor at the disposal of the factories. It is suggested that this should be taken advantage of as fully as possible and that female labor should be employed. In certain special cases where new contracts are being given in France, one of the clauses is that no native labor shall be employed. No source of labor must be neglected, and every effort must be made to see that each man is doing the work to which he is best suited. If a man with military obligations cannot be employed to the best of his powers he should be returned for active service in the army.

Manufacturers are recommended to adopt the forging method of making shells in preference to turning from a solid bar. Apart from the greater output possible by forging, there is a saving of a little more than 10 pounds of metal on each 75-millimetre shell. In a large number of factories apprenticeship classes have been formed. While it is not expected that these will turn out highly skilled workers, the movement will undoubtedly enable many with no present experience to operate automatic machinery. It is also pointed out that partially disabled men can be employed satisfactorily.

Army Cars Use Benzol and Alcohol

Fuels Used in Equal Portions Show Economy

PARIS, July 25—According to reports reaching here via Switzerland, German army motor cars are being run on a mixture of benzol and alcohol. As soon as Germany found herself cut off from outside supplies of gasoline, a technical committee was appointed to find a substitute. Experiments were carried out with a 1914 Mercedes touring car equipped with an ordinary carbureter, when mixtures of alcohol and benzol were found to give satisfactory results. Summarized, the results obtained in these tests were as follows:

Nature of the fuel employed		Speed obtained miles per hour	Distance covered with 1 litre of fuel miles
Benzol	Alcohol		
1 part	1 part	42.2	4.66
1 part	2 parts	41	4.4
1 part	3 parts	39.1	4.3
1 part	4 parts	38.5	4.1
1 part	5 parts	36	3.7
Benzol only		41.6	3.79
Gasoline only		43.49	3.6

Calculating on the rates existing before the war, the benzol-alcohol mixture is the cheapest fuel obtainable. One litre of gasoline costs 9 cents, benzol 8.6 cents, and alcohol 8.2 cents. This shows that a 50 per cent mixture of alcohol and benzol is the most economical, and it is this fuel which has been used throughout the German motor transport service. The only inconvenience experienced is the necessity

of a preliminary heating of the carbureter. Starting the motor is a difficult task, and on several occasions when the army has been retreating motor cars had to be left behind owing to the great delay in starting the motor. This difficulty has been overcome by fitting a secondary tank containing a small quantity of gasoline or ether. A three-way cock allows the supplementary tank to be put into connection with the carbureter for starting purposes. As soon as the motor is warm the reserve fuel is shut off and the alcohol-benzol mixture supplied to the motor. In case of a breakdown near the enemy's lines, or the loss of the main fuel through a bullet or piece of shell entering the tank, the reserve supply is used. This is able to take the vehicle 10 or 12 miles, which is generally sufficient to remove it from the danger zone. Apparently Germany has not experienced any considerable difficulty in getting all the supplies of alcohol and benzol she needs for her army motor service.

There is really nothing at all original in the use of a 50 per cent mixture of benzol and alcohol in an ordinary internal combustion motor built to consume gasoline. For several years the Paris General Omnibus Co. ran all its De Dion-Bouton and Schneider buses on alcohol carbureted

Ford to Make Trucks One-Ton Worm Drive When Experimental Work Is Complete

New 'Pleasure Cars Will Have Sloping Hoods and Crowned Fenders

DETROIT, Aug. 5—The Ford Motor Co., confirms the report that it will bring out a one-ton worm drive truck. Barring this brief statement nothing more was given out by any one in authority at Henry Ford's factory.

From what was learned in a round-about way, the Ford company expects to make 200,000 trucks the first year, and, on account of this large production, it is expected that the price of the truck will be \$500 or even less. At any rate, it is to be way below the price of any other one-ton truck ever made.

The policy which has caused the Ford success in the manufacture of its passenger cars will be continued in the new commercial car department. Only one model is to be made and when the first model comes out of the shops it is to be standard for years to come, or to be more explicit, when deliveries on the truck begins it will be with the knowledge of the Ford engineers, that, excepting for minor improvements, all the more important parts of the truck will be designed so that

no changes will have to be made for years.

It is said that while demonstrators will be ready within a few months it will not be before next fall that the truck will be made in quantities for actual delivery to customers.

Following the change of price announcement which appeared last week comes the news that there will also be a change of appearance in the pleasure cars, as the new Fords will be fitted with sloping hoods and crowned fenders which will give a new outline. The radiator shape also will be remodeled to accord with the moulded form that has now been adopted.

NO TRUSTS IN TEXAS

Dallas, Texas, Aug. 7—That the ruling of the Texas attorney general several months back in the prosecution of certain motor car concerns in Texas for alleged violation of the Texas anti-trust laws, has not hurt the industry in Texas, is the belief of dealers. As a result, however, of the attorney general's holding on the question it was necessary for car distributors to make new arrangements and agreements. Under his ruling it was violation of the law for car distributors to make contracts in writing for the sale of certain cars in certain prescribed territory. The new plan is for the distributor and the manufacturer to get together and by verbal agreement decide what territory he shall cover. This, it is declared, is not a violation of the law, while if the contract is put in writing it would be a violation of the law.

Federal Fraud Charge Government Forbids Interna- tional Automobile League Use of Mails

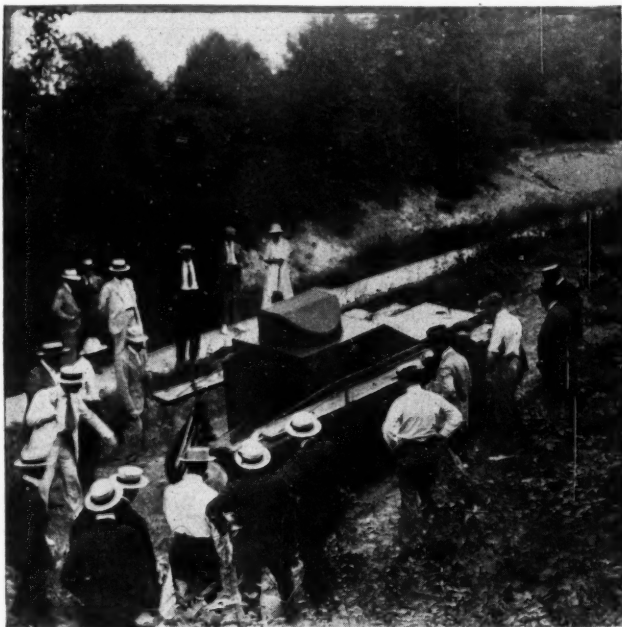
Pleas of Members Duped by A. C. Bidwell Open Eyes of Officials of Postoffice

Washington, D. C., Aug. 7—Cries for vengeance from many motor car owners in the United States who admit they were badly stuck brought results today when the postoffice department denied the use of the mails to the International Automobile League, Inc., and the International Automobile League Tire Company of Buffalo, N. Y., and A. C. Bidwell, president of both concerns. Charges of fraud were entered.

The action announced by Solicitor General Lamar is the result of complaints made last March by the American Automobile Association and the Associated Advertising Clubs of the World.

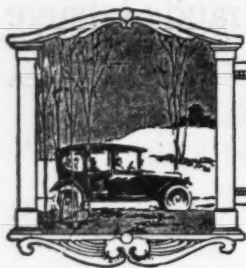
Bidwell was charged with amassing a fortune by employing agents who solicited members for the league by representing that membership enabled the motor drivers to obtain parts at manufacturers' prices.

League members testified that when they endeavored to realize the big savings they were informed that the league was "just out," but that an excellent article manufactured especially for the league could be supplied in place of the one ordered.

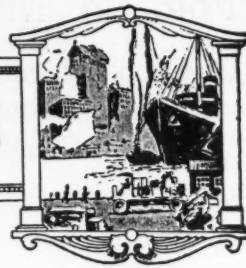


ARMY OFFICERS WITNESS TEST OF ARMORED CAR AS REPORTED IN MOTOR AGE FOR AUGUST 3

A test on an armored motor car mounted on a King eight cylinder chassis was held last week in Washington. The conditions which the car had to meet were equivalent to those of severe active service and the affair was in the nature of a demonstration to army officers of the U. S. marine corps. A severe climb over jagged rocks had first to be negotiated. This was up a grade 18 per cent, full equipment being carried. Then came a climb up a tortuous sand hill in which there were sunken boulders, tree tops, etc., to interrupt the passage of the car. Finally a test was made in the ravine used for trying out the army motor trucks. At the bottom of this there is a drop of 4½ feet into a water-filled ditch, and the car was compelled to drag itself out of this with the front wheels in the mud and the rear wheels on the bank above. Those who witnessed the test were Major Cassad, of the ordnance department, and Captains Williams and Ellis, of the marine corps. The car was built by the Armored Motor Car Co., Detroit, and is mounted on the regular King eight-cylinder chassis. It has now been taken to Philadelphia where it will be put through a series of tests approximating actual warfare conditions, even being placed on a battleship, taken to sea and accompanying a landing party.



EDITORIAL PERSPECTIVES



National Touring Week

THE one week of the year is here when you, as a motorist, will take the greatest pleasure in bundling yourself and family into dusters and touring regalia, and wagging your license plates in a wordless but well-understood greeting to the motorist of other states. It is national touring week. There is a thrill awaiting you as you turn the nose of your car into one of the national highways—and in these days these highways are available to almost every locality—and watch the licenses go by.

YOU are going to see cars from a great many different states and you can stack your car up beside another one from some other part of the continent and trade some of your dill pickles for the home-made cookies offered you by those strangers from the other car who will be strangers for the moment only, as it is a week of friendship.

YOU may meet a stranded car on the road and, of course, you will stop to offer assistance. It will be "Oh, you are from Charleston? Do you know so-and-so?" And he is going to know so-and-so—went to school with him when a boy—and there will be a laugh and a hearty good-fellowship all around.

IT is the annual roadside get-together of motorists from everywhere. The swapping of stories, making of new friends and a demonstration of the ability of the modern motor car to go and come, any distance, without trouble. It is the week when car owners will desert the pavements of city streets and find their pleasures in strange countries they have never traveled before.

Margins of Safety

MOTOR car accidents, to a great degree, are matters of miscalculation. It is the inexperienced driver who most often goes into the ditch. He has not acquired that instinct or second nature which prompts him to apply the brakes at just exactly the right moment or swerve his steering wheel just the right amount to avoid a wreck.

HARDLY a day goes by in which the newspapers do not contain the announcement of a motor car being struck by a railroad train and the results usually are the same—all occupants killed. The reason for nine out of ten of these accidents lies in the fact that the car driver misjudged his chances.

A RAILROAD train traveling at the rate of 60 miles per hour is moving over 80 feet each second. When a driver approaches a railroad track and sees a passenger train rapidly bearing down on the crossing ahead of him, let him consider that it will take him at least 10 seconds to get across that railroad track. During that 10 seconds the passenger train is going to travel approximately 800 feet.

THEREFORE if he is going to get across the track safely, that speeding train must be at least 1,000 feet away to allow him a margin of safety. How many motorists have

Horses in City Streets

THE coming of the motor car has been an important factor in reducing the noise of city streets. There is no means of transportation in existence which can out roar a pair of broad-chested truck horses, shod with eight shoes of steel, pulling a 5-ton truck with its steel tires and rattling axle boxes and spring shackles, over a cobblestone pavement. The heavy motor truck, even with its solid rubber tires and open exhaust, is mild in comparison.

POSSIBLY the sputter of an open exhaust, as far as real noise is concerned, is less voluminous than the hoofbeats of a single horse trotting along in front of a rubber-tired carriage. But the motor car is come and gone quickly and the rhythmic hoofbeats stay with you while the rig lumbers past. There is no doubt that the horsedrawn vehicle is the most noisy and most unsanitary of all traffic units using city streets, and the proposal advanced in New York City that a limit of 6 years be placed as the time after which no more horse trucks would be allowed on the streets, seems at least rational.

ANOTHER argument in favor of the elimination of horses on city streets is in the delay of traffic. Congestion at corners is due to necessary stopping of traffic to permit cross-street travel and letting off and taking on street-car passengers. But between blocks the delay can be blamed to horse-drawn vehicles almost entirely. If the minutes spent each day by street-car and motor-car drivers in dragging along behind drays and trucks were lumped into one sum it would very likely make a startling figure. The elements of speed and cleanliness are gradually pushing the horse from city streets.

looked at it that way? Better to lose those few moments in safety on the near side of the track than to try to make a dash and make the fatal mistake of miscalculation.

THERE is no margin of safety in skidding. A car may be driven around a corner at 15 miles per hour on a paved street which is newly sprinkled without skidding a hair's breadth. The next day that same car may be driven around the same corner, with the pavement in the same degree of wetness, at 10 miles an hour and slew to the curb. A pebble under the tire may start a skid. Any little unevenness of the road may cause the wheels to lose their traction, and once they start to slide they generally keep on going until some solid object stops them.

PROPER application of the brakes is, possibly, the greatest factor in extending the margin of safety. Brakes should never be applied on a slippery curve, and that is an argument for taking slippery corners slowly. The careful driver—the expert driver—will coast his car to a stop as nearly as possible, only using his brakes to assure him stopping at the exact place he wants to. It may seem pessimistic, but there is always a chance that the brake rod became broken after you last applied the brakes. It is better to allow a margin of safety.

Do You Suck Your Soup?

Reader Says It Is no Worse Than Opening Cutout

Raucous Tooting of Horns Like Walking on People's Feet

STILL they come. In the July 20 issue of Motor Age were printed the tales of woe of old Joe Stephenson and the mysterious Mr. X. J. W. Hayden attempted to soothe the wrought nerves of these two unfortunates who had suffered at the hands of motorists by an open letter printed last week, in which he suggested that they buy "one of the gol darn things," and give dust for dust and noise for noise, 50-50 so to speak. The morning search through the editor's basket unearthed the following, which comes from the Dakotas, but is, according to writer, applicable to "most any ol' place:"

"Why the possession of a motor car should so often work a disastrous change in ordinary considerate persons is one of the psychological phenomena that scientists as yet have not explained. Motorists who would be hurt to the quick if accused of being ill-mannered, nevertheless constantly indulge in practices which convict them of callous inconsiderateness of the comfort and convenience of others. And, after all, good manners are nothing in the world but a due regard for the feelings of others.

"Yet the average man, generally well mannered and considerate, starts his car and throws good manners to the winds. Late at night, passing houses whose occupants have long been in bed, he wakes

the hours with his horn, or, in order to save a fancied ounce or two of power, opens wide his muffler and with it the eyes of wouldbe sleepers. Almost it would seem, that like whisky, gasoline and good manners will not mix.

"Unfortunately, the observations are not only pertinent but admit of no denial. There is no reason why good training should not manifest itself as much at the wheel of a motor car as at the dinner table. Stirring soup with one's finger or eating pie with one's knife are no less signs of ill manners than their parallels on the street or road.

"The motorist's horn may demonstrate regard for others even in greater degree than a soup spoon. The noise of an open cutout popping saucily at the driver of a car just passed is no less offensive than the noise of soup syphoned from a ladle into pursed lips. The raucous tooting of horns at unnecessary times is rasping on the disposition, no less a demonstration of ungainliness than treading on one's feet at a fancy ball.

"True enough, good manners all too frequently are left at the front door when one goes motoring. When cars become the general vehicle for nearly all the people, it is time that we give some thought to our manners on the road. Let us be considerate in one place as well as in another, and let evidence of good or bad training be as effective in one place as in another."

MESSENGERS BY MOTOR CAR

Philadelphia, Aug. 5—Long distance night messages in this city are now being handled for the Western Union by motor car. Three roadsters are in use. It is understood the Western Union Telegraph Co. will try the plan in other large cities.

Deaf Mutes Make Tires

Work Under Superintendents Who Direct by Signs

No Accidents in Two Years Among Fifty Employed

ONE of the sturdiest and steadiest groups of workmen to be found at the plant of the Goodyear Tire & Rubber Co. at Akron, Ohio, is composed of deaf mutes. From time to time Goodyear has accepted them as employes when well recommended and able to pass the physical requirements. So successful have been the efforts in training them to become efficient workmen, thereby enabling them to compete successfully with their more fortunate brothers, that the company has received many expressions of commendation for the interest manifested in them.

By their expertness in building and finishing tires they have demonstrated that the lack of the ability to hear and speak need not necessarily become an insurmountable handicap, for they are among the most efficient of workmen. Care has been exercised in assigning them to tasks from which the accident hazard has been practically eliminated. That Goodyear has provided well for their personal safety is evidenced by the fact that in 2 years not one of the fifty mutes employed has experienced an accident. By working them in squads under supervisors able to converse with them in their sign language, their working conditions are made congenial and their efficiency enhanced. They are enthusiastic athletes. This, too, helps make them efficient workmen.



See America First —
See America Now

EDITOR'S NOTE—This is the ninetieth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

NO. 90—PALISADES IN CRATER NATIONAL PARK—The Crater lake preserve is one of the few government reservations which extends into two states. Its area is 878,948 acres and it borders in California and Oregon. Its confines contain extinct craters which are of great value in tracing the volcanic phenomena of that vicinity. Many places are inaccessible.

Rickenbacher Wins at Tacoma—Entries for Pike's Peak

Milton in a Duesenberg Sensation of Day at Race

Thirty-Two Cars to Compete for \$1,200 Purse

TACOMA, Wash., Aug. 6—Special Telegram—Twenty thousand race enthusiasts saw Eddie Rickenbacher, in a Maxwell, outrace the fastest field of entries gathered in the northwest and take first place in the 300-mile speed contest on the local speedway. He won easily at an average speed of 89.3 miles per hour, his time being 3:21:40.1. Milton in a Duesenberg was second at an average of 88.6, and Lewis in a Crawford third, his average being an even 88 miles per hour.

De Palma's Mercedes set the pace from the start, leading the 14 entrants and holding the lead consistently until 175 miles when engine trouble set in and so checked his speed for the rest of the race that he was unable to secure better than fourth money. His average was 87 miles per hour.

Those next to finish were, in the order that they crossed the tape, Henderson, Maxwell; Toft, Omar; Chandler, Crawford. Milton crossed the tape first at the 100 and 200-mile point, thereby winning the Potlatch trophy, awarded for accomplishing this feat.

One Minor Accident

Johnson, of the Crawford team, suffered the only accident of the day and that in the first lap when broken goggles caused by flying stones injured one of his eyes. He had the wound patched up and re-entered the race, using his one good eye for directing the car until he was forced out in the sixty-ninth lap with a broken valve. A broken valve also pegged D'Alene in his Duesenberg. He was out in sixty-four laps.

The features of the day were two spurts made by Milton to cross the pole first in the 100 and 200-mile limits. The Duesenberg driver surged in the lead 1 second ahead of de Palma in the 100 and had the same lead over Rickenbacher in the next century. At 226 miles Rickenbacher passed Milton and received a great ovation from the crowd. He retained his lead through the finish.

Barney Oldfield in his Delage, with but nine laps to go and practically sure of taking fourth place, met the jinx which seemed to feature the race, namely valve trouble, and was out for good. Latta in a Dodge Special, the unknown of the race, kept up a steady grind until the ninety-eighth lap when he was out with engine trouble.

Fast work by the pitmen of both de Palma and Rickenbacher was of great assistance in keeping the time up where it was. The weather was ideal and the track fast, and the meet was undoubtedly the most successful financially and in interest shown of any held previously in the northwest.

The cash prizes were divided as follows: Rickenbacher, \$4,000; Milton \$2,000, with \$500 for crossing the tape first in the 100 and 200-mile marks; Lewis \$1,500; de Palma \$1,000; Henderson \$750; and Toft \$250.

BUILDING TOM ALLEY SPECIAL

Los Angeles, Cal., Aug. 4—Tom Alley, the first of the Eastern speed merchants to come to the Pacific Coast to prepare for the Vanderbilt and grand prize events, is having a new motor built at the plant of the Harry A. Miller Manufacturing Co., which is to be placed in Alley's new car, the Tom Alley Special.

The motor is designed by Miller and is to bear the maker's name. It is claimed to be different from any other racing motor now in use. It is to be entirely incased in aluminum, with the exception of the two magnetos and the throttle.

The bore is to be 3½ and the stroke 7. The motor is to develop almost 150-horsepower at 3,000 r.p.m. The oiling system is one of Miller's own design. There are two separate systems on a double-gear pump system and if both of these fail under high speed, there is the splash system. There are no outside oil lines to the motor; the oil arteries are cast in the metal.

For 7 months, Miller has been working on this motor and even his closest friends were not aware of the work that was going on until Alley arrived in this city and the motor was brought out from Miller's private workroom at the plant. It was announced by Alley today that the motor would be ready for the block tests Aug. 10.

CANADIAN LICENSE NOT GOOD

Milwaukee, Wis., Aug. 4—A Canadian license plate is not sufficient for motor travel through the state of Wisconsin, according to an opinion of the attorney general, who says that foreign-owned cars operated in Wisconsin must have a license from this or other states which have reciprocal license laws. Recently a Canadian car passed through Marshfield, Wis., bearing only the Canadian license tag. A question arose over the propriety of detaining the owner, and the attorney general's ruling was the result. However, the Canadian motorist had been released and it is not thought that further action will be taken. However, the ruling will be used in future cases and will doubtless be of interest to other states in which travel by Canadian cars is frequent.

DENVER, Colo., Aug. 5—At 5 o'clock this afternoon, 7 hours before the official closing time for entering cars in the first annual Pike's Peak hillclimb next Friday and Saturday, August 11 and 12, there were thirty-two cars entered to compete for the \$1,200 Penrose trophy and the \$4,800 in cash prizes offered by the Pike's Peak Auto Highway Co., owner of the famous cloudland race course. The entries represent twenty makes of cars, all specials, and the list of drivers includes names known throughout the motoring world.

All these cars except two Ford specials in event No. 1 are entered for the big event on Saturday afternoon, while seven of them, the two Fords and two other special cars to be driven by main-event contestants, are entered for the morning event on Friday; and eight of the main event entrants comprise the list for the Friday afternoon race.

Amount of Prizes

First, second and third prizes of \$500, \$250 and \$150 will be given the winners of each Friday event, while the main event, on Saturday, will carry a first prize of the Penrose trophy and \$2,000 in cash and a second prize of \$1,000. This handsome trophy of Colorado silver and gold, which has been donated by Spencer Penrose, Colorado Springs sportsman, is valued at \$1,200, stands 43 inches high, and is declared to be the richest trophy ever offered for any motor car race. The winner this year is allowed to retain the trophy 11 months, when it must be returned to the race promoters for the next annual contest. To obtain permanent possession, an entrant must win the cup three times.

The only thrill thus far presented outside of the regular program was an accident yesterday to Ralph Mulford and A. H. Patterson, who were in one of the special cars on a trial trip and were thrown from their car when a front wheel collapsed near the top of the course and slammed the speeding machine into a huge boulder on the edge of the road.

The entries for the big event, which is officially called No. 3 and is a free-for-all race for class "D" non-stock cars, open to any gasoline car which complies with the definition of a motor car, regardless

Those Who Placed, Times Made and Prizes at Tacoma

DRIVER	CAR	TIME	AVERAGE	PRIZE
Rickenbacher	Maxwell	3:21:40.1	89.3	\$4,000
Milton	Duesenberg	3:23:05.62	88.6	2,500
Lewis	Crawford	3:24:29.35	88.0	1,500
DePalma	Mercedes	3:27:20.41	87.0	1,000
Henderson	Maxwell	3:33:03.96	84.5	750
Toft	Omar	3:33:25.62	84.4	250

of piston displacement or other specifications, are as follows:

No. Trial	Make—all specials	Driver
1	Cadillac	Harold S. Brinker
2	Studebaker	C. C. Morgan
3	Cadillac	A. W. Marksheffel
4	Grant Six	Henry S. Jones
5	Chalmers	Roy Stentz
6	Chalmers	A. E. Walden
7	Buick	Marion M. McCoy
8	Hudson Supersix	Ralph Mulford
9	Wisconsin	James Weir
10	Hudson Supersix	A. H. Patterson
12	Duesenberg	Hugh Hughes
13	Peugeot	Bennett Hill
14	Milac	Nell Whalen
15	Stutz	Gustave Duaray
16	Delage	Barney Oldfield
18	Maxwell	Not announced
19	Ford	Guy Peterson
20	Pathfinder	Alvah Hughson
21	Ford	Walt Henry
22	Packard	C. W. Johnson
24	Peerless	Not announced
26	Giddings	I. P. Federman
27	Stutz	Not announced
28	Buick	Not announced
29	Romano	Lea Lentz
30	Saxon	H. A. Wetmore
31	Peugeot	Ralph Mulford
32	Duesenberg—300 cu. in.	George Buzane
33	Duesenberg—360 cu. in.	George Buzane
34	Hudson	Not announced

The following are the entries for event No. 1, Friday morning, for class "E" non-stock cars, which is also open to class "C" cars with piston displacement of 230 cubic inches and under:

No. Trial	Make—all specials	Driver
5	Grant Six	Henry S. Jones
5	Chalmers	Roy Stentz
6	Chalmers	A. E. Walden
7	Buick	Marion M. McCoy
14	Milac	Nell Whalen
18	Maxwell	Not announced
19	Ford	Guy Peterson
21	Ford	Walt Henry
23	Ford	Isadore Spangler
25	Ford	E. H. Knowles
30	Saxon	H. A. Wetmore

The two Chalmers specials in this race are smaller than the Chalmers cars entered in the big event by Stentz and Walden, but carry the same trial numbers. The two Fords entered by Spangler and Knowles under numbers 23 and 25 are entered for this event only.

Event No. 2, Friday afternoon, for class "C" non-stock cars, allowing piston displacement of 231 to 300 cubic inches, has the following entries, all of which are also listed for the main event:

No. Trial	Make—all specials	Driver
5	Chalmers	Roy Stentz
6	Chalmers	A. E. Walden
8	Hudson Supersix	Ralph Mulford
10	Hudson Supersix	A. H. Patterson
12	Duesenberg	Hugh Hughes
15	Stutz	Gustave Duaray
16	Delage	Barney Oldfield
32	Duesenberg	George Buzane

The above numbers for all events are being used now in practice trials, and may not be the starting order in the contests. The races will be conducted under the auspices of the American Automobile Association and according to the rules of that body. Ralph W. Smith, Colorado vice-president of the A. A. A. and member of the A. A. A. contest board, is referee, and honorary referee is Spencer Penrose. The starter is Dean M. Gillespie and Chester Recker will have charge of the timing.

CAN USE MIDGLEY NAME

Columbus, O., Aug. 4—Thomas Midgley, Sr., has been denied an injunction against the Lancaster Tire and Rubber Co. for alleged use of his name in their business.

Car Thievery in Chicago

Insurance Companies May Raise Rates as Result of Thefts

3,000 Stolen Since January 1—Federal Law Suggested

CHICAGO, Aug. 7—Insurance companies writing floater policies on motor cars in Chicago are aroused over the large number of thefts in the city. It is estimated that there have been over 3,000 cars stolen in Chicago since January 1, and the insurance companies claim to be losing money on this end of their business. They have made the statement that the present rates could not continue with such odds against them, and that the rates will be raised.

Investigations made by State's Attorney Hoynes in his extensive hunt for the recently indicted members of the thieves' trust, as it is called, have convinced him that a federal law is needed for the detection and punishment of motor car thievery. It is his expressed belief that, as nearly all stolen cars are driven or shipped into distant states, an interstate or federal law would afford the most adequate remedy for grappling with the evil.

Another conclusion reached by the official is that some relief would be afforded if prospective purchasers of second-hand cars would be more careful in ascertaining whether the sellers of used cars have the legal title to the property they sell.

Recently a car was stolen in Chicago, shipped by railroad to Wisconsin, and received by a man who had never set foot in Illinois. The thief never set foot in Wisconsin. The machine was then shipped to Minneapolis, where it was received by a third party. None of these parties left his own state. In this case a successful prosecution in Illinois was almost impossible. The same holds true for the other two states.

CAR FOR EACH THIRTEEN IOWANS

Des Moines, Ia., Aug. 7—Iowa now has 178,000 motor cars, one for every thirteen of population, on the basis of the 1915 census, as compared with 141,000 at the same date last year, which was one for every seventeen of population. The records of the state registration department also show that 7,500 cars registered last year have not been registered for 1916 and county attorneys have been furnished with lists of delinquent owners with instructions to collect the fees with penalties.

Some of the cars registered last year have been junked and put out of commission or have been removed to other states. There was a rush for the registration of new cars on August 1 when the attorney general ruled that cars purchased

on or after that date could be registered for half the regular fee for the year. The total number of cars registered in the state last year was 146,000, and the total this year is expected to touch the 190,000 mark. A total of \$1,407,138 already has been distributed among the counties from the motor vehicle fund of the state this year as compared with \$1,137,766 for the entire year of 1915. This money is used by the counties in the building of good roads.

OVERLAND GAS TEST

Cincinnati, O., Aug. 7—W. T. Foley, assistant secretary of the Cincinnati Automobile Club, recently conducted a gasoline test of a Model 86 Overland. A car was taken from the stock of the Citizens Motor Car Company. The main tank was disconnected from the carburetor and a small tank, which held one gallon of gasoline, was connected. The carburetor was then set so that the engine ran freely both on low and high speed. The speedometer reading then was taken and the car was run over a prescribed course, until it stopped for lack of fuel. The speedometer reading was then taken again, and it was found that the car had traveled 17.83 miles on one gallon of gasoline. This gasoline was not high-proof, but an ordinary grade, of which the hydrometer test showed a reading of 59 degrees. This feat was considered unusual as the car had just been taken out of stock and had never been run before. The switch was not thrown nor the clutch disengaged during the trip.

SHOW UNDER CANVAS

Tacoma, Wash., Aug. 7—The Northwest Buick Company, distributors of Buick pleasure cars and G. M. C. trucks in the Pacific Northwest, and maintaining headquarters in Seattle and Spokane, have hit upon a novel plan for the exploitation of their lines throughout the state of Washington, and, in accordance with a well-defined and organized sales plan, will show at all fairs and exhibitions in the state of Washington this year a complete line of Buick cars and G. M. C. trucks under their own canvass. The initial effort in this direction was made in Lincoln County, Wash., during the encampment of the Pioneers' Association of Lincoln and Adams counties, held June 21 to 23rd.

While not intending to engage in the circus business this company has purchased its own tent, the size of which is 40x80 feet, and in which are contained a Buick D-6-45 and a Buick D-6-55 together with a three-fourths-ton, a two-ton with trailer, and a five-ton G. M. C. truck. At the conclusion of the exhibition the tent and accoutrements were folded, packed and hauled away on the G. M. C. trucks, much after the fashion of a circus. And the next show will see the company's trucks headed in its direction to again demonstrate to Washington.

Federal Report on Fuel

Shows Gasoline Can Be Produced Profitably at 17 Cents

Crude Oil Dropping While Refined Prices Change But Little

WASHINGTON, Aug. 8—Special telegram—While the report of the Federal Trade Commission on the high cost of gasoline will not be presented to Congress for a week or two, according to reliable information, it is said the commission's findings probably will not lead to the prosecution of Standard Oil magnates. It is understood by those in close touch with the commission that while the report will show strong evidences of "hogging" on the part of some oil men, there is said to be no evidence disclosing actual illegal activity in keeping up prices.

The report also will show, it is understood, that concerns selling gasoline could make a substantial profit with gasoline at 17 cents a gallon. In the final analysis it will be up to the Department of Justice to determine whether federal action is demanded.

Within the last 10 days there has been a reduction of 30 cents a barrel in the price of mid-continent crude oil, the quotation falling from \$1.55 to \$1.25 in the posted market. The decline has been sharp and apparently indicates the leading market interests are determined to check the overproduction which was fast becoming serious.

Prominent oil men are of the opinion that the decline in the price of Oklahoma oil will go farther and that it is not unreasonable to expect \$1 oil in the mid-continent field. Any reduction below that point would make oil cheap and probably would result in a heavy buying movement by all the refiners.

Eastern Prices Lower

New York, Aug. 11—Gasoline was reduced another cent yesterday in the East, the price to the retailer in New York and Connecticut being 23 cents and in New Jersey 22 cents. In Boston the Standard has reduced the price 1 cent to 24 cents wholesale, the retail price being 26 cents. New York retail prices vary from 24 to 26 cents.

No Reduction in Chicago

Chicago, August 7—At present there has not been, nor is there any immediate prospect of, reduction in the retail price of gasoline. While there have been reductions within the past 10 days, it has been in districts where the price to the consumer has been some higher than in this territory. There has been considerable done in the way of opening up new wells and reopening older ones, due to the gasoline demand and demand for crude, but it

is not believed that this will affect the prices in this territory for some time to come.

Gas Lower in Dallas

Dallas, Texas, Aug. 5—For the first time in several weeks Dallas motorists are riding on 18-cent gasoline. In some places the gas is selling for as little as 17 cents per gallon.

The cause of this decline, it is said, by dealers at Dallas is the general reduction in the price of crude oil. A still greater decline is expected within a few days, because of the recent bringing-in of many wells in the oil sections of the South. Fifteen cent gas within a few weeks is predicted.

STROMBERG DEAL COMPLETED

Chicago, Aug. 5—Final details for the financial expansion of the Stromberg company were completed late this week in New York. As reported in Motor Age 2 weeks ago, the Stromberg Motor Devices Co., Chicago, with a capital of \$50,000, has been taken over by the Stromberg Carbureter Co. of America, recently incorporated in New York with a capitalization of \$5,000,000. The new board of directors of the Stromberg Carbureter Co. of America consists of Charles W. Stiger, William L. O'Neill, and Charles H. Brown, of Chicago; H. C. Stutz, president of the Stutz Motor Car Co., Indianapolis; Allen A. Ryan, George H. Saylor, of the Chase National Bank, and Frederick E. Gunnison. Mr. Stiger, president of the old company, becomes president of the new one. Ryan becomes vice-president, Gunnison treasurer and Saylor secretary. In the older concern, the officers remain as before, except that Ryan replaces Androv Carlson as treasurer. There will be no change in the policy of the company.

NASH MOTORS STOCK PLACED

New York, Aug. 5—Stock of the Nash Motors Co., recently organized by Charles W. Nash, formerly president of the General Motors Co., with a capital of \$5,000,000, has been placed. The new company, as previously announced, has taken over the assets and business of the Thos. B. Jeffery Co.

CASSIDY GETS KIMBALL JACK

New York, Aug. 4—The Edward A. Cassidy Co., New York, completed arrangements with the F. W. Mann Co., Milford, Mass., to market the Kimball ball-bearing jack throughout the world on a long-term exclusive sales contract. Plans now under way for a rapid extension of manufacturing facilities will increase production to an annual output of 150,000 Kimball jacks, and it is understood that still further extensions will be made as conditions warrant.

The Kimball jack will be standard equipment on the Franklin car, the H. H. Franklin Mfg. Co. having contracted for 10,000.

Packard Breaks Record

Courses Lap at Indianapolis at Over 100 Miles per Hour

Racing Car Equipped with Twelve Cylinder Aviation Motor

INDIANAPOLIS, Aug. 3—Beating its own record of 100 miles an hour on the Indianapolis Motor Speedway yesterday afternoon, the Packard racing test car now at the track lapped the two-and-one-half-mile oval in 1:29:32. This speed is better than 100 miles an hour and lowers all Indianapolis records for cars under 300 cubic inches. The only car which has gone faster on the track is Oldfield's Christie, which lapped the track at a speed slightly less than 1:28.

Rader broke the track record with a new car fitted with the Packard twelve-cylinder aviation engine. He carried a mechanic and 40 gallons of gasoline. This is the first time that a lap of the speedway has been made at 100 miles per hour by a car under 300 cubic inches piston displacement and the 298 cubic inch Packard breaks the record hung up by Boillet in 1914 when he made a lap of the track in his 380 cubic inch Peugeot without a mechanic and with very little gasoline in 1:30:13, or slightly under 100 miles per hour.

Five Watches Catch Time

Five watches, all held by disinterested parties, caught the lap. Howard Marmon of the Nordyke & Marmon Co. acted as chief timer and, when the time was averaged, it showed a lap in 1:29:32. Three of the watches caught the racer in 1:29½, but the average was cut by the other two.

J. G. Vincent, chief engineer of the Packard Co., who is making tests of his light aviation motor, superintended the performance. Carl G. Fisher, president of the Indianapolis Motor Speedway, was present as were representatives of a majority of the motor car companies of the city. After the test Mr. Fisher gave instructions that an official document be given the Packard company certifying the time made.

According to Mr. Vincent's statement the car was an exact duplicate of the one used in the Sheepshead Bay tests with the exception that the intake headers had been slightly changed to give improved gas distribution at high speed. Ten gallons of gasoline were carried and the driver and mechanic were both large men.

HAYNES HAS NEW FOUR PASSENGER

Kokomo, Ind., Aug. 8—The Haynes Automobile Co. announces a new four-passenger roadster fitted to either the six or twelve-cylinder chassis. Deliveries on this model are now being made.

Motor Cars an Adjunct to Beach Delights

THAT the bathing season has found the motor car more versatile than before is shown in these pictures. The latest in Chicago is to take an inner tube from the motor car for a life preserver. The Pacific coast bather, however, goes the lake bather one better and uses the whole tire as a surf board. Why not have tires guaranteed not to rust or warranted non-sinkable, one might ask.

Of course, the car has always played an important part as a field dressing-room for the movie actor, but now it is invading the dominion of the bath house. No car is too poor to furnish a de luxe room for the owner who couldn't if he would, or wouldn't if he could, get a locker in the beachhouse. Hundreds of cars are parked in the streets leading to and bordering the beaches.



Eddie Pullen makes the wheels go around on the track, but the girls at Venice, Cal., have turned his own weapon on him at the beach



Oh, for a life on the ocean wave—and an inner tube to float in. Only this was taken on the lake at Chicago and not at the coast



"Mother, may I go out to swim?" "Yes, my child, we'll all go in the car."



Left—Would you call them fresh fish if someone told you they had been caught swimming in the lake? Center—Miss Ivy Crosswhite, of Los Angeles, uses leather-soled shoes to drive her car down to the beach; otherwise, she is ready to dive in

West May Be West and East, East, but the Twain Do Meet



Bob Paulson, left, California's camping expert, also thinks the car an adjunct to bathing. The tent is a motor car beach one of aeroplane cloth with floor of thin rubber. This is popular with the California motorist who bathes in the surf. The car is parked on the road above



Above left—Rapid transit by motor to the beach, a scene in Chicago. Oval—Mrs. R. L. Beekman, wife of the governor of Rhode Island, also motors to the beach at Newport. Right—Miss Dolly Mings rides the breakers on a tire at her hometown ocean at Ocean Park, Cal.



Clarendon municipal beach, Chicago—hundreds of cars are parked nearby daily. It is a beautiful as well as a popular beach. Thousands have found relief from the heat there this summer.

In a Common Interest in Car and Water, Says the Camera

The owners have parked their cars and joined the crowd on the beach. This is typical of the lake front in Chicago, especially along the north side, where three beaches adjoin each other

Introducing Roscoe Arbuckle as he drives his Alco to the beach. The undershirt and derby are part of his bathing suit



Is little brother afraid of punctures? What a slam on the man who made the tire!



Right—Miss Bessie Eyeton, Selig star, uses her Maxwell for a dressing room at the beach



Above—The latest things in touring togs for summer, that is, beach touring. Right—Could Dobbin serve as well? No, this is more than a family horse



Yellowstone Trip Ends

Hundred Tourists Made the Motor Journey Through the Park

Woman Was Pacemaker on Twin City Sociability Run

GARDINER, Mont., Aug. 5—Traveling de luxe as a family party the Yellowstone tourists in their twenty-four cars emerged today from their sightseeing trip through Yellowstone park and started back to St. Paul in their special Northern Pacific train, thrilled with their experiences of the last fortnight. They voted the sociability tour just completed as one that will go down in motor history as unique and novel in every detail.

About 100 motorists made the entire journey, leaving the Twin Cities on July 20 over the National Parks highway. They toured by day, stopping at noon and night controls for meals served aboard the train. During the night stops they slept aboard luxurious Pullman cars.

It was the first time in history that such a long organized tour, run purely for pleasure and without any contest feature attached, had a woman as pacemaker. Mrs. F. P. Sheldon, wife of a Minneapolis banker, in her Cadillac coupe, led the column the entire distance.

True, there were seasoned campaigners participating. Among these were Dr. J. D. Park, president of the Duluth, Minn., Automobile club, winner of the Glidden tour of 1913, and Bohn E. Fawkes, Minneapolis, winner of the Helena tour in 1911.

John Thompson, a Washington, Ind., capitalist, was along with his family, this party driving in a Packard twin six. The Thompson car was driven from the Indiana

city to enter the tour and was given the 75-pound cake presented by Hazen J. Titus of the Northern Pacific railway for being the entrant who had driven the longest distance to participate.

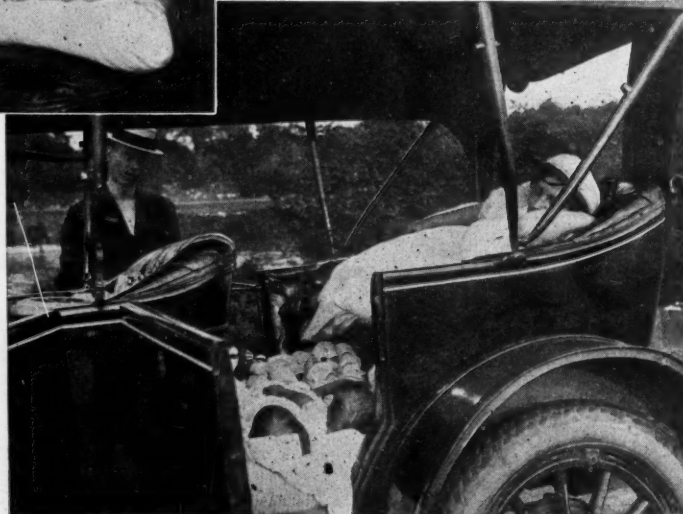
It was distinctly a family party. Several entrants brought their entire families, including children as young as 1 year old.

After leaving Gardiner, the party of motorists climbed the picturesque Gardiner canyon, passing the first night within Yellowstone at Mammoth hotel. Here, several of them caught their first glimpse of Mammoth Hot Springs.

They reached Old Faithful Inn on the second day and saw several playings of Old Faithful geyser, a most extraordinary sight. The continuous action of other geysers, hot springs, paint pots and dragons' mouths seemed to impress them greatly. Mountain trout seemed to be in an accommodating frame of mind, for several good sized catches were made during the time spent within Yellowstone's unlimited confines.

On the outgoing trip many places of interest were visited. At Medora, Col. Roosevelt's old home, they were treated to a genuine round-up, including daring horse-back riding, steer-throwing contests and lasso contests.

Governor L. B. Hanna, who, with his family, was among the tourists, made the dedication address at this place, when the new motor bridge completing Red trail from east to west was formally opened.



HOW THE MOTOR CAR HELPED OUT DURING CHICAGO'S HOT SPELL

When the mercury began to hover around the centry mark and the weather man could promise no relief, sleeping became a thing of the past for many of Chicago's residents. But the parks did offer a little air, and the motor car was as comfortable a bed as one could find. So, while hundreds of less lucky persons slept on the grass and benches around him, the car owner opened his doors for ventilation, and the outdoor sleeping quarters were ready for occupation.

Motor King at Cheyenne

Frontiers Day Celebration Draws Crowd That Comes in Cars

Every State in Union Is Represented by License Plates

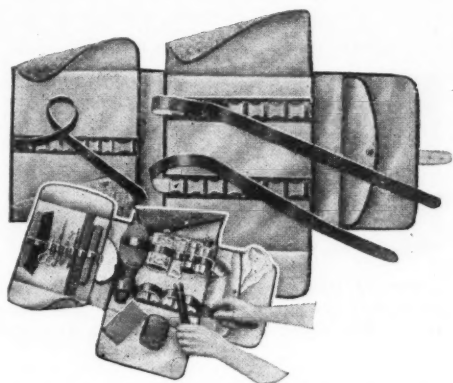
CHEYENNE, Wyo., Aug. 3—It is doubtful if there has ever been any gathering in the West which more emphatically proclaimed the motor as king of the road than the last Cheyenne Frontier Days Celebration, held July 26 to 29. The crowds, in thousands, came from over the plains and mountains, as in times past they came to see the hair-raising broncobusting and steer-roping.

But the crowd that packed the grandstand and the bleachers to overflowing was visibly, audibly and distinctly a motor car crowd. On the afternoon of the second day a count was made of the cars parked on the Frontier Park grounds and on the open prairies adjoining. One very noticeable variance from eastern car gatherings was the absence of wire-wheeled machines. There were only three parked at the grounds and it was not because the cars were not new for hundreds of new bright bodies bespoke a large volume of recent sales. Nearly every state in the Union was represented on the license plates in and about the grounds and every conceivable type of touring-camping arrangement and device could be found on the cars present.

Hotel and lodging accommodations were early sold out and cots in hallways were at a premium, so the tourists and motorists who brought their own beds and roofs were lucky beyond all mention.

Little Things in Motoring That Count for Woman's Comfort

Some of the Traveling Accessories in the Shops That Increase Riding Pleasure



A kit that really is a joy forever

NOW, when so many motorists are taking to the open road to seek relief from the dog days, one of the questions of the moment is not so much how to carry provisions and clothes, but where to obtain the desired carriers. The old way was to call "All Aboard" and then throw the baggage, camping utensils and what-nots into the places left vacant.

But this belongs to prairie schooner days, so to speak. More and more the innocent bystanders who used to let the engineer of the tour swamp them with baggage demanded, if not comfort, breathing space. And they were heard, for several years have passed since the manufacturers first began making and advertising special equipment for the touring car.

The Hartmann Trunk Co., 626 South Michigan avenue, Chicago, offers four answers to this question of where to get the desired carriers. The company carries a motor restaurant and a motor refrigerator, both of which are to be fastened on the running board of the car. They resemble good-sized toolboxes. The refrigerator also has a lunch kit for eight persons on the inside of the lid, and the section for the ice is entirely separate from the partitions for the food. The motor restaurant sells for \$24; the refrigerator, \$27.50.

In motoring, as well as in traveling by rail, the problem of keeping the clothes presentable is a serious one. One great drawback to touring, especially when the tourists wish to stop at the larger places for a few hours, is to find that there is "simply nothing fit to wear." But preventive steps have already been taken in both modes of travel; witness, the wardrobe baggage.

A wardrobe suitcase has been designed especially for use in touring. It is to be fastened to the running board in an upright position. The suitcase holds three men's suits or four women's suits and has a tray with partitions for accessories. It is more like a small steamer trunk than an

ordinary suitcase and contains the features of the wardrobe trunk on a smaller scale. Prices vary from \$25 to \$55.

A motor roborail bag is priced at \$5.50. Its material is moleskin, an imitation patent leather which has proved popular this season. It is fastened by leather straps to the rail. The handle is similar to those on other hand baggage. A large flap conceals an outside pocket on one side, into which articles can be placed while the bag is hanging from the rail. The bag is perfectly flat and takes little room. On the short trip elaborate equipment is not necessary, and the motorist may find this unobtrusive bag just what he wants for the small articles.

Fits and Misfits

This is a tale of fits and misfits. It comes from the ancient tradition that many a woman motorist has tried to fit her pet toilet articles into a traveling kit only to find it couldn't be done. Nothing would fit except the things that came with the kit, which in most cases were foreign to her knowledge.

The Fitall adjustable toilet kit upsets this tradition. It comes fitted or unfitted and so arranged that a box can be exchanged for a tube without causing a misfit.

This kit has adjustable spaces, which the movable straps change by varying the size of the loop as desired. Nor will the straps slip if each space is not filled. When all fittings are in place, the straps are drawn through two loops in such a way that they lock automatically.

The result each time the straps are adjusted is a traveling kit which holds, and holds adequately, the set of articles you fancy. And it does not matter how often you change your mind as to what you do fancy. The kit folds compactly and has three large pockets for wash cloths or other articles.

The Fitall kit is sold by the Oshkosh Trunk and Bag Co., 219 South Wabash avenue, Chicago. The purchaser has a choice of any of twenty-two values which range from \$1 to \$17.50. The materials used are cravenetted and waterproofed cloth; black and white shepherd checks; grain leather; genuine morocco; cowhide, and seal, with plaid, plain, or figured linings of cravenetted and waterproofed material and leather.

Three sizes, large, medium and small, are offered. The fittings are sold separately, either in ebony or in Parisian ivory, for from \$1.75 to \$6.

Both men and women will find the Fitall kit convenient. For it is strictly neutral, and gives safety razors and powder boxes the same impartial service.

Beauty Hints for the Woman Motorist



AS the theater season approaches, the woman who has neglected her skin while motoring finds herself wishing that she could remove the tan makeup which she has acquired. For tan and other ravages of the sun and wind are not improved to any great extent under artificial light. And for the woman there is a consummation also devoutly to be wished that she be able to exchange the motorist role for an indoors role without advertising her former avocation by her face.

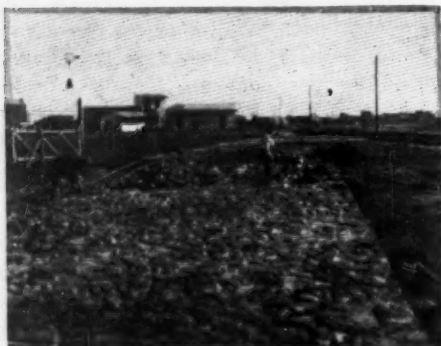
Tan, freckles and sunburn are no necessary evils, however. Carelessness is responsible for most of the ills that summer and outdoor sports seem to make the skin heir to. In warm weather the skin relaxes. The pores are more open, and hence more quickly clogged. In spite of this, you probably sit on the beach in the sun with no protection for your face or hair. Your hair becomes dry and sunburned. Your skin, aided by long motor trips in the dust and grime, also becomes dry and sunburned. But you can motor, swim and live outdoors most of the time with only slight effect on your skin if you follow a few precautions.

One thing that hinders the prevention of freckles, tan and sunburn is the almost universal practice of using powder as a cure-all. This is harmful rather than helpful, and especially so when care is not taken in the selection of the powder. Of course, the powder itself may not be harmful, but there is always a danger of clogging the pores with it, and this is as much to be avoided as clogging the pores with dust.

Powder is one of the first-aid means of prevention, moreover. The judicious use of a pure cold cream, followed by a light dusting with a pure powder, will protect the skin as no veil ever does without adding the discomforts of heat and closeness to its protection.

No doubt many have let the summer go by so far without paying much attention to the skin. But if the sun and wind have not caused too much damage already, prompt steps will save future trouble in bleaching.

Argentine's Highways—The Great Road System That Is Not



Heavy stone foundation used in the Buenos Aires-La Plata road. This is on a stretch near Buenos Aires adjacent to a railroad crossing

BUENOS AIRES, June 23—Argentine's road system is as primitive as its abode huts of the colonist farmer illustrated in "The Face of the Argentine" last week, yet it has one road which is the finest in South America. We know of nothing so good in U. S. A. or Canada and in several thousand miles of touring in England and France we have not found anything that compares with one road of 65 miles recently completed.

Yet in road vernacular, Argentine ranks zero minus. With its huge area equivalent to that of U. S. A. east of the Mississippi, and with its level camps and its rich, fertile soil, it requires a great road system and it will have one relatively soon, but today you do not purchase a car in Argentine for the purpose of a pleasure trip from one city to another, you purchase it for pleasure use in and around some cities and perhaps as a utility car for the camp.

General Outline of Roads

For a first general impression of Argentine's improved road, bring before you a mental picture of U. S. A. from the Father of Waters to the Atlantic seaboard and from Calais, Me., on the Canadian border to the southern tip of Florida. Then look at New York and imagine a good road to Poughkeepsie halfway to Albany along the Hudson. Picture this as good a road as really exists between New York and Poughkeepsie today. Add to this picture another road from New York to Poughkeepsie, paralleling the first one and often not a golf-drive distant from it. Imagine a third road from New York to the celebrated Tuxedo Park in the mountains of New York State west of the Hudson, a distance of 35 miles from Broadway.

Now shift the scene for a moment and fix your mind on Dayton, O. Radiate from Dayton perhaps five or six good white gravel roads each leading 25 or 30 miles out through rolling country into a low range of

The South American Republic Has 65 Miles Which Surpass Any Road in the United States, But Lacks a Trans-Continental Path

By David Beecroft

Editor's Note—This is the third of a series of articles on South America by David Beecroft, managing editor of Motor Age, who has just completed a lengthy trip through the Argentine, Uruguay and southern Brazil. In the preceding article, published in Motor Age issue of August 3, the author described life in the camp of rural Argentine.

hills in which are located perhaps six or seven very good tourist hotels.

When you have done this your picture of roads is complete. Scatter over the remainder of this territory from the Mississippi to the Atlantic a few virgin trails here and there and a few stretches of graded dirt roads. Suppose you could not drive in a motor car from Dayton to Columbus; from New York to Philadelphia; from Boston to Portland, Me.; from Chicago to Milwaukee. Suppose you could not even make the trip from Indianapolis to South Bend; from Buffalo to Rochester; or from Cleveland to Toledo. Such would be the condition of this part of U. S. A., if it had a road system on a par with that in Argentine today.

Argentines already have dreamed day dreams of roads. The pioneer motorist has circummotored the country. He has driven not only directly across from Buenos Aires to Mendoza, the New York-San Francisco trail of the country, but he has gone south over the almost limitless pasture areas to the south; and he has pioneered from Buenos Aires to the extreme north into the sugar lands to Tucuman and beyond to the frontier of Bolivia. It is several years since the Touring Club of Argentine surveyed the land linking up the important cities, pioneering efforts similar to our first transcontinental trips from San Francisco to New York when Tom Fetch required 24 days to get his Packard from



One of the constant views before you when traveling over the Buenos Aires-La Plata stone road. The slight rolling country can be noted

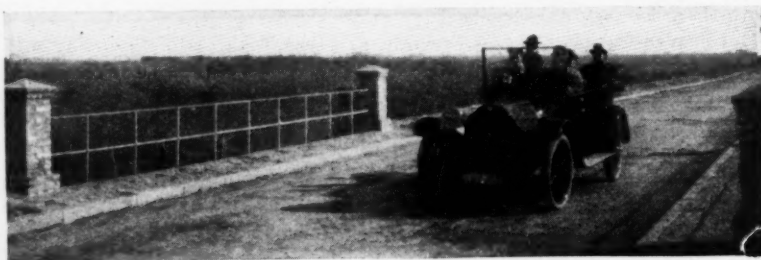
coast to coast and whose stories of roads and lack of roads lacked nothing of the glamor of a chapter from the Arabian Nights.

So is Argentine today. Glance at the map. It may be the first one you have seen showing the country divided into its twenty-five provinces. Here they use the word province in preference to state. Brazil styles itself the United States of Brazil and as there is as much rivalry between Argentine and Brazil as there was between Ancient Rome and Carthage you can scarcely be surprised when Argentines prefer that their land be called The Argentine Republic. This republic has fourteen provinces which, because of their population and progress, have risen to that importance that each is governed by a senate and a legislature, the system being very much the same as in our own states. Ten others are called territories as they have not yet attained the stature of provinces. Lastly comes what is called the Federal District in which Buenos Aires, the capital, is located, just as our own Washington is the Federal District of Columbia.

Census Map of Provinces

The map gives the population of the different provinces according to the census of 8 years ago. A new census has just been completed and it shows considerable gains. Buenos Aires contains practically 25 per cent of the entire population of the country, a most unusual distribution of population, and is a city without a parallel with the exception of Sydney, New South Wales, Australia, which city has a still higher percentage of the population of the country.

Get outside of Buenos Aires and the population becomes sparse. You start looking for it. There are really only four provinces that have a considerable population and these are all adjacent to Buenos Aires. These are the prov-



Crossing one of the several bridges on the stone road between Buenos Aires and La Plata. The price of building the road was stupendous

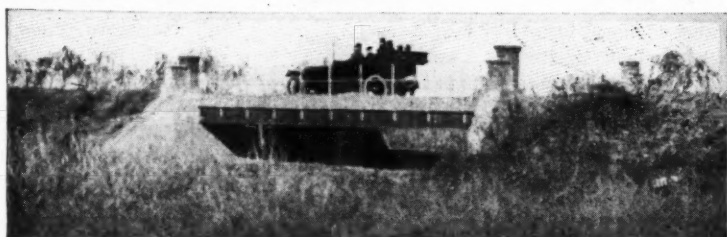
ince of Buenos Aires in which the capital is located; the province of Santa Fe containing Rosario which is the second city in the country; the province of Cordoba with the city of Cordoba, which is the old educational center of Argentina; and lastly the province of Entre Rios on the north in the great cattle raising country and where some of the best known beef extracts and teas come from. Entre Rios means 'between the rivers,' the Parana flowing by it on one side and the Uruguay on the other. These four provinces contain 72 per cent of the population of the entire country and so to them you must look for all of the road progress. However, they do not contain all of the roads. On the west side is the province of Mendoza, which is the heart of the grape culture and the center of a very great wine industry. Here is a population well over 200,000 and as rainfall is very slight, only eight inches per year, irrigation is resorted to. The province lies at the foothills of the Andes and

so road building is easy, material is plentiful and you find some very good roads. It is really worth while owning a motor car there.

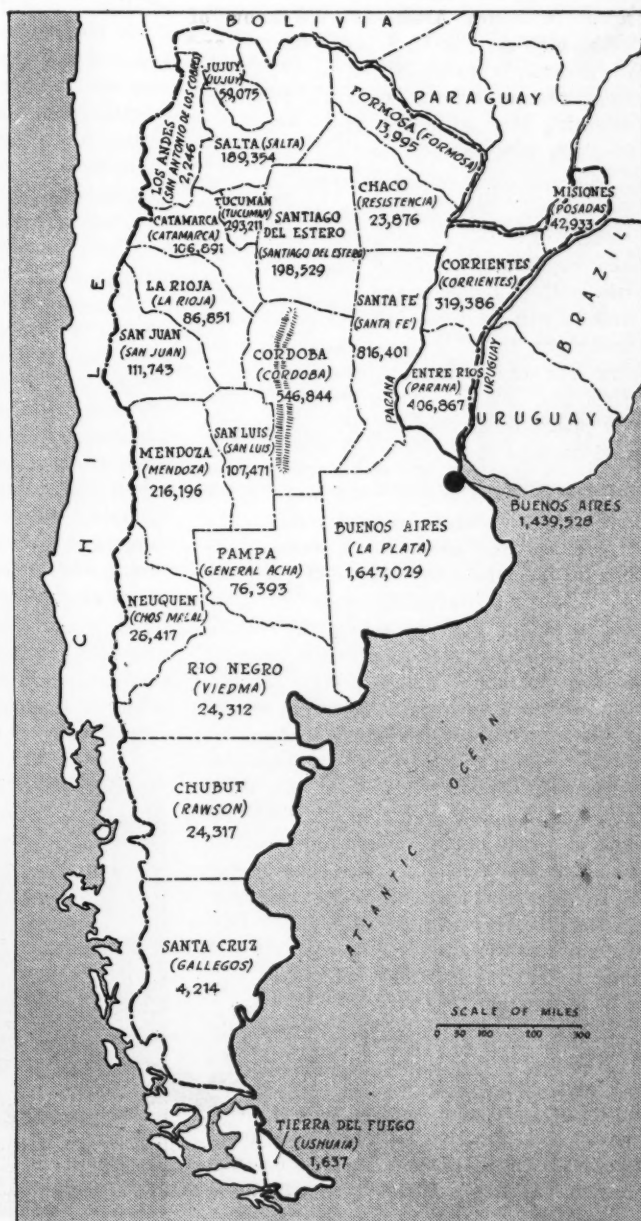
There is another province in which it is worth while owning a motor car and that is in Cordoba. It is a little north of center of the country. Through this province extends north and south two ranges of mountains that are from 2,000 to 3,000 feet high and the city of Cordoba nestles on beautiful rolling country east of the hills. Here is another nucleus of good roads. There is plenty of gravel and the governor of the province has built five or six roads leading into the mountains. They are as fine gravel roads as the eye of man ever looked upon. No state in U. S. A. can boast of better gravel highways than Cordoba has, but she has too few of them. These roads are straight as an arrow and from a wide highway broad enough for three cars abreast they grow thinner and thinner as they lead the eye to the distant hills 30 miles away

until they finally lose themselves as a thread of white amid the mountain green. You go on and on. We made the trip in a Cadillac eight, driven by Albert Fehling, the Buenos Aires agent of this car for fourteen years, and we were traveling at 62 miles per hour for several miles in a stretch. As you approach the mountains the straight roads cease and you get into a series of valleys through which have been built roads nearly as marvellous as some of the recent road creations in Colorado. The roads in these valleys are not so good as the Colorado roads, but the engineering effort, so far, is as great. The eye will see three or four horseshoe curves around one hill and you are no sooner through those than you enter another series. Sometimes these curves are not 100 yards apart and frequently you cannot see more than 50 yards ahead of you. On many curves you have to go at snail pace as the radiator often hangs over a precipice 100 feet deep.

Thus through these mountains have the



Beginning at top, the illustrations are: One of the many stone bridges on the Buenos Aires to La Plata stone road. Note the artistic brick towers at each corner; you are constantly meeting men on horseback who are the overseers for the large farmers. In a few years these men should be using motor cars; typical structure of road along railroad in province of Buenos Aires. This photograph was taken from the train window while the train was making 30 miles an hour; old stone road leading into the mountains from Cordoba



Map showing provinces of Argentina



Left—Typical views just outside Buenos Aires on the touring road between Buenos Aires and La Plata, showing how it is built in the center of the old horse road. Right—A better type of farm home seen along the roads near the city of Cordoba. It is a tinted rough cast, the favorite tint being pink or cream color

proud citizens of Cordoba started a chain of fine gravel roads. They started 5 years ago and are still going ahead with the work. On a day's trip over these roads you meet three or four huge steam rollers, the same as you may meet when traveling over the Lincoln Highway in Illinois. As you drive over these fine ribbons of white frequently lined on one side and often on both with rows of eucalyptus trees, which bear a resemblance to our poplars, your eye ever falls on the serrated tops of the mountains, and the view is just as exhilarating as when Denverward in U. S. A. your eye catches glimpses of the eternal snow on the top of Mount Grey or Mount McClellan in our Rockies. The plain of Argentine is not so rolling as our Mississippi valley and for miles before reaching Cordoba on the trip from Buenos Aires the eye is steadily looking for hills.

Cordoba as a Resort

Cordoba has ambitions to become the mountain resort section of Argentine and it will unquestionably achieve that distinction. It has an excellent climate and the air is as clear and as bracing as in our own western states. We were there in their fall. Winter was a few weeks off, and we had to wear our New York winter overcoats every day and then we were cold as the evening came on. Cordoba with its goal of being the White Mountain or the Colorado pleasure grounds has already many fine mountain hotels, a few of them with golf links that would do credit to our own western states.

But to resume the thread of highway development in the Argentine: We must leave Cordoba and take a night's ride by train to Buenos Aires because you could not make the trip in a week by motor car in dry weather and in wet weather you could not make it all. Some day over fine improved roads the motorists will cover it in a single day, but that will be in some fine tomorrow.

Back in Buenos Aires there are really only three roads leading out of the city that you can motor on. All three are highly modern and one is ultra-modern. Two of these lead to La Plata, a seaport 63 miles east of Buenos Aires on the shore of the River Plate. La Plata is a model city. There is no other to compare with it in all South America, and

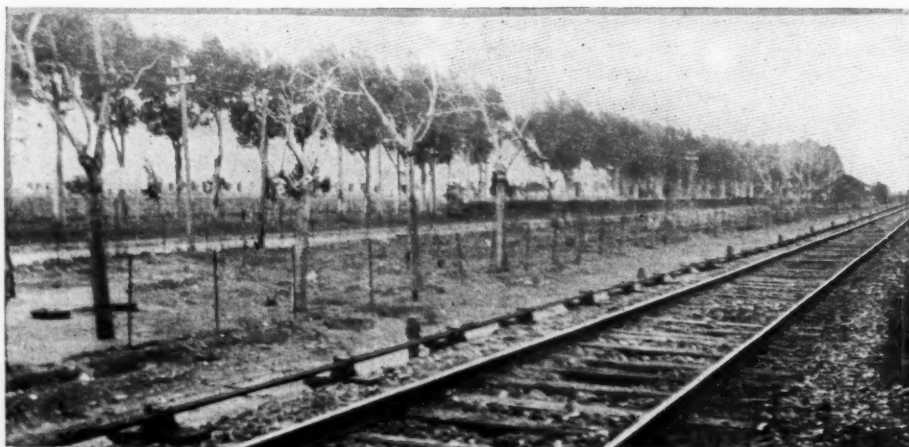
we have no city in U. S. A. that can compare with it. It was laid out to be the national capital of Argentine, the plan being to take the political capital away from Buenos Aires. The city was started, and many fine buildings built, and wonderful streets and plazas laid out, when suddenly it was discovered that Buenos Aires had rebelled and was not going to let the political capital be shifted away. La Plata for the time was doomed, but soon a semi-resurrection took place in that it was made the capital of the Province of Buenos Aires. A comparison might be between New York City and Albany, La Plata being the Albany of Argentine.

It is not surprising that there are two fine roads leading from Buenos Aires to La Plata, one a fine stone road and the other a good hard dirt road. The stone road is just being completed. When we drove over it in a Studebaker six last week there were a few of the big cement bridges not completed and there was one railroad crossing not completed, but in 2 months it should be all finished, and when done it will be a road monument not only to Argentine, not only to all South America, but to the entire world. It is unquestionably one of the finest in the world, and a credit to the French engineering firm that is building it.

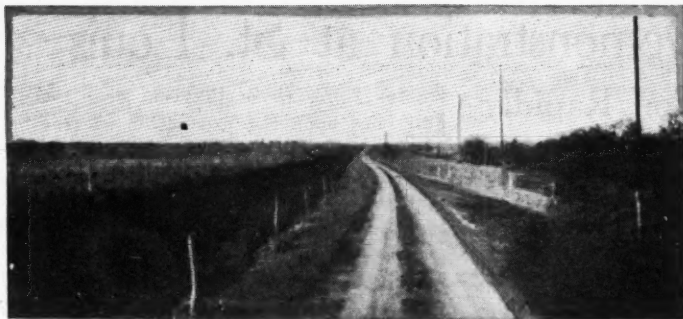
This is a stone block road running over a 63-mile stretch which is as level as a billiard table. The road for nearly 40 miles is straight as an arrow and as smooth as a speedway. The route

does not follow the river, but is inland so that the view is that of The Face of Argentine, an agricultural panorama with cattle in droves that extend as far as the eye can see. There are mud huts on the land on either side of the road and only one huge stone castle, the home of an estanciero in the entire distance. It is the only evidence of real progress, excepting the cattle herds, and you feel sorry that such a grand and elaborate three-story imported stone edifice is lost on the pampas instead of being on Lake Shore drive, Chicago, or on upper Fifth avenue, New York. It is a truly wonderful home, with perhaps 8 or 10 acres of garden and grounds filled with shrubs of many varieties. It is a landmark that you see for miles before you reach it and one that you keep turning back to take a final look at. It sets you thinking of the peculiar system of the Argentine, of how one farmer may count his land in hundreds of thousands of acres, while all around him are thousands who cannot own a square foot. Here the large landowner lives, perhaps worth millions, but he has not a neighbor with whom to associate. His friends are in Buenos Aires, and there he goes and there he lives just as long as it is not necessary for him to be on the farm.

These digressions into the character of the people may serve to give atmosphere to the road building problems of this country in the near future. It should not be hard to interest these wealthy people



View of road along railroad in province of Buenos Aires between city of Buenos Aires and Rosario



Left—Roads are being made better every year since the motor car came to South America. This is a section of the motor road from Buenos Aires to La Plata. The middle of this highway is used by the Tour Club of Argentina and the sides for wagons. Right—Steam roller working on the roads between Cordoba and the mountains

in road building. They want the roads, but they do not know how to build them.

Returning to this new stone road: It is like a double-track railroad right-of-way in the distance; from a side view, you think it is such. The square stone blocks forming the surface are twice the size of a building brick and just as smooth. On either side of the brick strip, which is perhaps 30 feet wide, is a stone or cement curb as fine as you ever saw along a city boulevard. Wherever a farmer's gate comes this curbing is curved as carefully as possible, and the ditch is spanned by a cylindrical culvert 3 feet in diameter. The ends of the culvert are faced with red brick with white mortar, all as neat and clean as a rural church in New England. Where a virgin cross-trail enters, the curbing is curved as needed. One stretch of several miles passes over a low river bed and here are ten to twelve fine modern bridges all in a row, often not over 200 yards apart. These bridges are reinforced cement with red bricks facing and square red brick pillars at the four corners. You would search in vain for such a road in U. S. A. and I do not know of such a one in England or France.

Nothing has been left undone in the building of this road. It is the last word in the art; but unfortunately it has a deterrent effect on road building in Argentine rather than a stimulating one. The cost was stupendous. The government has not given out complete figures, but the price must have been well over \$25,000

per mile. As a result Argentines have been convinced that road building is expensive and a few who dreamed of such a system of roads spanning the entire country have changed their minds and now think that the great Republic of the South, as they call their land, is doomed to future generations of bad roads. Argentines know what good roads are. They have motored over the finest roads of France, Germany, Switzerland and England and they dreamed only of such roads in their own land, and it is only within the last year or so that such dreams have had such a rude and cruel awakening.

There is a second road from Buenos Aires to La Plata. It is known here as the touring road, and is a hard dirt road over which you drive with the utmost comfort at 40 miles per hour, or higher if you care to go. This road was built by the Touring Club of Argentine. The Touring Club of Argentine is an old motoring organization made up of some of the finest business men in Buenos Aires. It is not an organization of motor car dealers, but motor car owners. Some of the wealthiest business men here are members and the president is the owner of *La Prensa*, one of the two large daily papers. It was local pride that fostered this touring road in Argentine. The Federal Capital should be coupled with the provincial capital of the premier province, as in coupling Albany with New York, or we might say Washington and Philadelphia.

Out of Buenos Aires there is one other modern road of 35 miles to Tigre, a big summer section, where there is excellent boating, where there are good hotels, where there are fancy tea houses, and where in general the Buenos Aires citizen delights to go in the hot weather.

But we have come to the end of our improved roads. There are no more. The others have to be built.

It would be unjust to leave Argentine roads without adding that in many of the provinces real effort is being made to build dirt roads. In the Province of Santa Fe and in that part surrounding the great city of Rosario are many good and improved dirt roads. In some places are U. S. A. road graders that have improved stretches of 20 miles in different sections. but the results are so small in proportion to what has to be done that you almost overlook them.

Car Agencies in Argentine

In so vast a region much is required to make a small showing, but what has been done has already brought results in the greater sale of motor cars. Ford has a very fine selling organization in Rosario and his cars are going into the camps around Rosario in hundreds. Studebaker opened here nearly 8 months ago and will put well over 100 cars into the camp around here. Many of them are sixes, but the majority fours. Overland has a good agency here. Case is represented with a good branch house, and within a few weeks there will be other agencies opened, such as Dodge, Maxwell, Hupmobile, Scripps-Booth, etc.

Argentine is today waiting for a whole army of good road missionaries. Her great campaign for road education is just beginning. Several daily papers are taking up the cudgel. Several of our road building machinery houses have their representatives in Buenos Aires and they are already flooding the country with good roads literature. Road building arguments are finding places in the papers, but as yet no great dream of a highway system for Argentine has been conceived. Trans-Atlantic highways have not yet entered their head. The Argentine does not yet know of the pleasure of driving for days over his vast pampas on a smooth dustless road, but the future has this in store.



An uncompleted section of the Buenos Aires to La Plata stone road shows the graded roadbed before the stone foundation has been applied

Third National Tractor Demonstration at St. Louis

ST. LOUIS, Aug. 4.—With fifty-four tractors plowing Missouri soil, the third of the series of eight national tractor demonstrations was formally opened here on Tuesday morning in much the same manner as those at Dallas and Hutchinson. Tractor manufacturers and dealers, however, are not as optimistic regarding results to be obtained as they were at the previous demonstrations. In this respect, however, it is pertinent to point out that these great tractor shows are far different from motor car shows. Contracts seldom are signed on the spot and for this reason it must necessarily be some time before the real good that has been done can be checked up.

For example, the Moline Plow Co. has but recently closed up some fifteen dealers as a result of the demonstration held

Cash Proposition Rapidly Becoming Feature of Tests

at Hutchinson last week. And every one of these was for from three to twenty-five machines. Again, the C. O. D. Tractor Co. has just closed with the Western Farm Tractor & Supply Co. for the entire state of Kansas. The Wallis Tractor Co. has signed up with Piffer Bros., Denver, to handle the state of Colorado as a distributor. This company took an initial order of 100 machines and will pay cash for them.

This cash proposition, by the way, is rapidly becoming the feature of the demonstrations. The newer companies in the

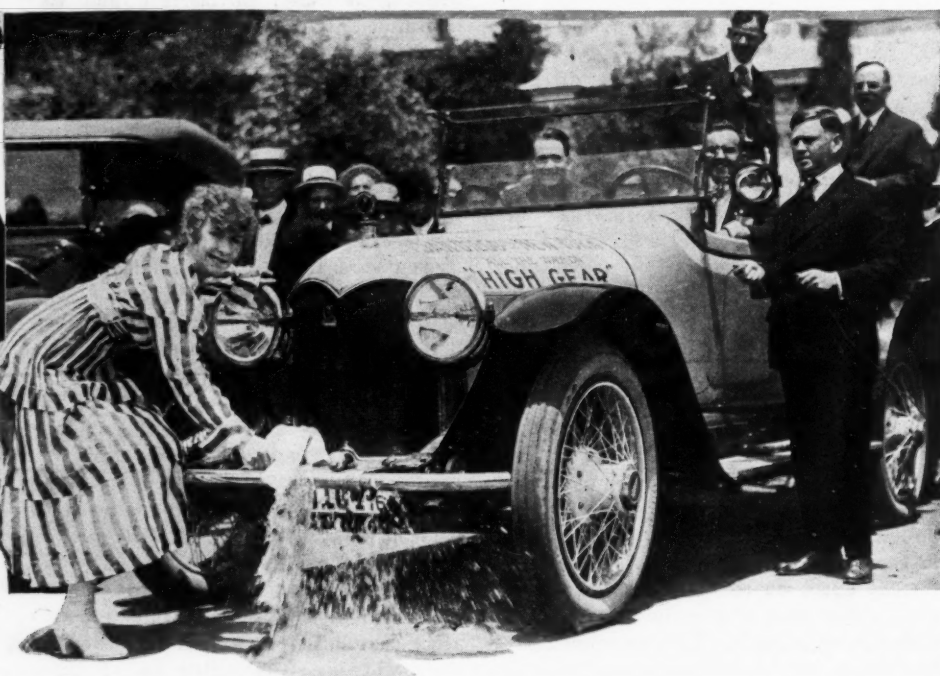
tractor field, those that center all their activities upon the production of tractors and make no other farm implements, are invariably making contracts which call for cash on delivery. And even the old-line implement manufacturers are now coming around to this way of doing business. Some have been conducting business in this way during only the past year and others are taking the step now for the first time. They reason rightly that if the farmer is willing and anxious to pay cash for his motor car, and if the newer members of the tractor family can extract cash from the distributor and the ultimate owner, there is no reason why they, too, should not do so.

Another significant feature is that the tendency for the tractor manufacturer to favor the motor car dealer and the garage-

Pathfinder Twelve Goes from Coast to Coast on High Gear



Affixing official A. A. A. seal before starting Pathfinder across continent



Christening of high-gear Pathfinder before start

NEW YORK, Aug. 5.—The Pathfinder twin six which left San Diego, Cal., on July 3 to cross the continent on high gear arrived here August 1. The car was met by a delegation of Pathfinder owners and officials of the American Automobile Association, being conducted to the Sheepshead Bay Speedway, where it was run over a measured course at 60 m.p.h. as a final demonstration.

The car was officially sealed in high gear by the A.A.A. through its representative, Al G. Waddell of Los Angeles. The seals have been inspected frequently throughout the route by A.A.A. officials and officers of the Lincoln Highway, over which the car was operated throughout the entire distance. The mileage covered was 4,921 at the completion of the mile test on the Speedway. After this it was taken to the New York agency and

re-measured by officials to check up as a stock car.

No attempt was made to acquire a high speed average, as the average distance traveled daily was 200 miles and no night driving, to any extent, was done. Four days were spent at various points along the trip in idleness, so that altogether the trip occupied 28 days. The car is geared 5 to 1 on high, this being the standard ratio that is sent out with cars to hilly territories.

Walter Weidely, son of George Weidely, designer of the engine employed in the car, drove practically the entire distance. He was checked in and out of every town of consequence along the way by hotel keepers, chambers of commerce, etc. The

worst point along the route was Lucky Boy Mountain, Nev., where it required strenuous efforts to pull the car over on high gear. Rain was encountered at Rock Springs and Laramie.

A gasoline consumption of 10.2 miles to the gallon was averaged over the route. The car carried a driver, mechanic and a number of spare parts, including a clutch and extra live axles which were never used. Two of the tires, both on the left side, had California air in them when the car arrived at New York. The right tires were changed along the route. The highest price paid for gasoline along the route was at Fish Springs, Utah, where it was 65 cents. The final demonstration on the Speedway ended the run.

man as a dealer is growing more marked as the demonstrations progress. Furthermore, few companies are making contracts unless the dealer actually purchases a machine. Only a short time ago all this was different. Tractor makers were glad to give a slice of territory to almost any one who was willing to sign a contract and agree to talk tractor to a farmer who might saunter in and inquire. Now, however, the tractor manufacturer expects the dealer to buy a tractor, to display it in his place of business and to go out after the tractor business.

This, in brief, seems the real reason why the tractor maker prefers the motor car man to the implement man when the motor car man shows any aggressiveness at all. The motor car dealer always has a demonstrator. And he always is going out after the business. His method is in vivid contrast to that of the implement dealer who, though he may have a stock of implements on his floor, remains in the store and waits for the farmer to come and buy.

Distribution of Tractors

The implement dealer still is the principal factor in the distribution of farm tractors, but if these national demonstrations furnish a light that does not fail, the motor car dealer and the garageman will soon oust him from his position.

The demonstration here has not been as well attended as have previous demonstrations, but there are several reasons for this. The first is that most farmers are busy at this time getting their corn in. This was put in late and now is being harvested. Another reason is that on Tuesday there was a primary election, which naturally kept the farmers at home. Another reason is that the demonstration field, which is in Kinloch park, is 16

miles from the city and the transportation facilities are not all that might be desired. It is expected that later in the week the farmers will flock to the field and that dealers and distributors also will put in an appearance.

Unfortunately—here again is demonstrated the smallness of Missouri farms—it was not possible for those in charge of the demonstration to secure one large field, as in Dallas and Hutchinson, where all the machines might plow at once. Ground for plowing is limited and for this reason many of the companies are compelled to demonstrate only their small machines. Some of the machines are in one field and the remainder in another field



John Ringling, left; John N. Willys, center; Harry L. Shepler, right

perhaps a quarter of a mile distant. At least the smallness of the available field has had the advantage of bringing into prominence the work of the smaller tractor and in the opinion of agricultural experts it is the smaller tractor that Missouri must look to for the most part.

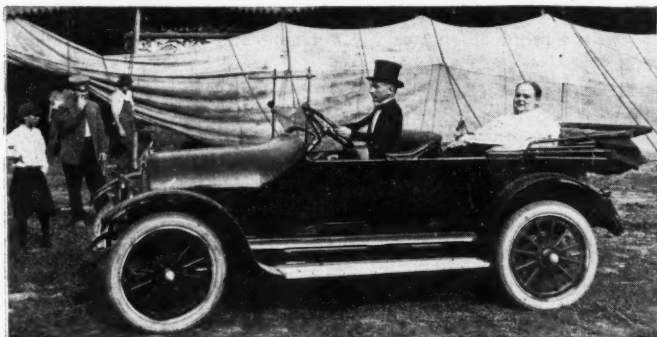
Kerosene is used slightly more extensively here than at either Dallas or Hutchinson. During the first day of plowing, thirty-three of the machines were working on kerosene as against twenty-one operating on gasoline.

The accessory exhibit, instead of being in one large tent as heretofore is in two tents and is attracting quite as much attention as in Dallas and Hutchinson. So far, no dealer or jobber has thought it advisable to exhibit a full line of such accessories as might be used on a tractor and this seems shortsightedness on their part. Tractor users are just as interested in accessories as are motor car users and they will buy accessories just as freely. Certain things they must have, such as spark plugs, piston rings, wire, fan belt, grease and oil cups and a hundred and one other things, yet neither implement man nor automobile man has made a play for this trade by putting such merchandise on view.

Ford Tractors at Fremont.

Detroit, Mich., August 7.—Henry Ford and his son will be at the Fremont, Neb., national tractor demonstration with three of Ford's new tractors. Ford and his son will travel to the demonstration in a private car. The three tractors will be of exactly the same type, but will be operated on gasoline, kerosene and alcohol, respectively. In addition to the tractors, Ford will also have a comprehensive display of the various parts which enter into the construction of this machine.

John N. Willys Buys Ringling Circus for Three Days



The skeleton gives the fat boy a joy ride in Overland model 75 B



A clown's tribute to the Overland—one of the many features of the circus party

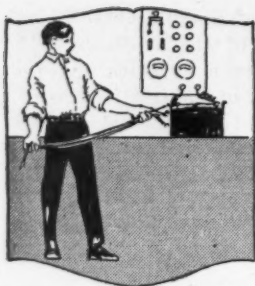
TOLEDO, O., Aug. 4—Host to 60,000 people—one-quarter of the entire population of Toledo—John N. Willys, president of The Willys-Overland Co., entertained for 3 days—July 27, 28 and 29, the families of the 17,300 employees of The Willys-Overland Co. and those of several other Toledo factories associated with his plant, with six performances of Ringling's circus.

For 3 days everything was free, from

the tickets admitting their bearers to side shows, menagerie tent and main attractions, even to car tickets to and from the circus. Each employee was presented with three admission tickets and six car fares. Sixty thousand admission tickets and 120,000 street car tickets were printed for the occasion and distributed.

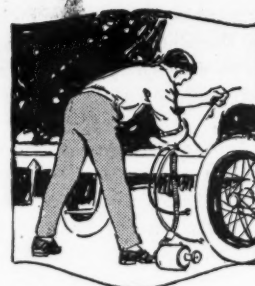
The circus party is an outgrowth of Overland day, which for a number of years

has been the big play day of the Overland plant. For 5 years the entire factory had shut down for a half-day once each year and had marched to the baseball park in Toledo to attend professional ball games. In 1914 and 1915 major league ball clubs were brought to Toledo for exhibition contests in mid-season. But this year it was decided to include the families of the employees in the festivities.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the seventh installment of a weekly series of articles which began in Motor Age, issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

WHAT HAS GONE BEFORE

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems and the relations of current pressure and resistance brought out. This was followed by an explanation of series and multiple circuits and how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells were taken up and the best methods of connecting them.

Part VII—Storage Batteries

WHEN the negative plate of a primary battery is nearly consumed, it is customary to replace it with a new plate; or, in the case of the dry cell, to replace the entire cell by a new cell. If a current of electricity be sent through the cell from an outside source in a direction opposite to the direction of the pressure produced by the cell and the metal in the electrolyte deposited back on the negative plate, instead of replacing the plate or the entire cell, the cell is called a storage battery. When a current is passing through a storage cell in the direction of the pressure; that is, from the negative to the positive plate within the cell, the cell is said to be discharging; and, when a current is passing through the cell in the opposite direction to its pressure; that is, from the positive to the negative plate within the cell, the cell is said to be charging.

The fundamental principles of the storage battery differ in no way from the primary cell; that is, any primary cell could be used as a storage cell and have its negative plate restored by sending a current through the cell in the opposite direction to its pressure, as is done in the commercial types of storage cells. The ordinary primary cell cannot have its negative plate restored economically and hence it is commercially more efficient either to replace the

negative plate by a new one or to replace the entire cell when the negative plate has nearly wasted away. There are, however, some certain combinations of plates and electrolytes which may be used as a storage cell when especially constructed for the purpose.

You must get this fact clearly fixed in your mind—a storage cell does not store electricity, but it stores chemical energy.

During the process of charging electrical energy is transformed into chemical energy and stored within the cell; while during the process of discharging, chemical energy is transformed back into electrical energy. Neither of these transformations is made without some loss which prevents as much energy being drawn from the cell when it is discharging as was put into it when it was charging.

Types of Storage Cells

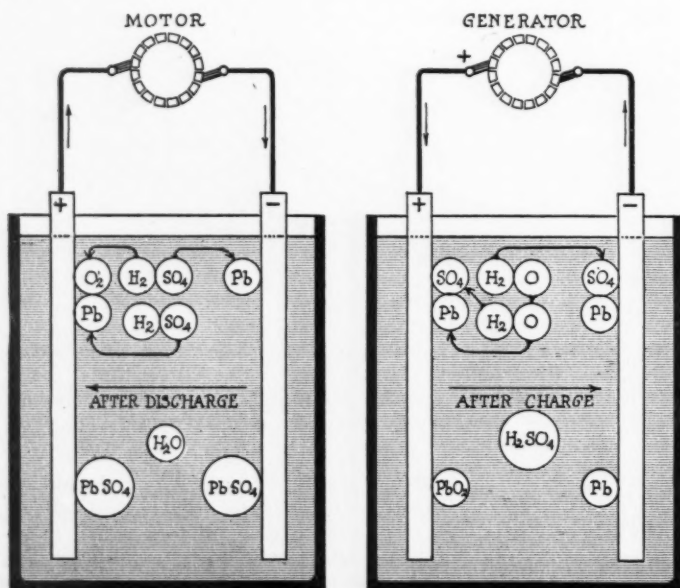
Storage cells may be divided into two main groups, according to the kind of materials used in the construction of the plates. These groups are lead storage cells and non-lead storage cells, and the construction and operation of the two types will be discussed somewhat at length in the following sections. A great deal more attention will be given to the lead storage battery on account of its characteristic at present being such as to make it much better suited to the requirements of the starting and lighting equipment.

Lead Storage Cells

In the construction of the lead storage cell, the *cathode*, or positive plate, is composed of lead peroxide, PbO_2 ; the negative plate, or *anode*, is composed of pure spongy lead, Pb ; and the electrolyte is sulphuric acid, H_2SO_4 , diluted with water, H_2O .

Spongy lead and lead peroxide are rather poor conductors of electricity and their mechanical characteristics are such that they cannot be made into plates themselves and it is necessary that they be supported by frames of some material which is stronger and harder, and at the same time a better conductor of electricity. The material used for these frames must be one which is not acted upon by the acid, as otherwise there would be a local action between the spongy lead and the frame or between the lead peroxide and frame whenever they happened to be in contact. The material that is most generally used in constructing these frames, usually called grids, is an alloy of lead and antimony, which is mechanically stronger and stiffer than pure lead and it is not acted upon to any great extent by the sulphuric acid.

The lead peroxide and spongy lead are usually spoken of as the *active materials*, in order to distinguish them from the grids. The combination of active material and framework is spoken of as a *plate*. It is a positive plate when it is a combination of lead



Figs. 55 and 56—Chemical action in a storage cell during discharge, at left, and during charge, at right

peroxide and the framework, and negative plate when it is a combination of spongy lead and the framework.

General Types of Lead Cells

There are two general methods of attaching the active material of a plate to the framework and these methods of constructing the plates give rise to two types of lead cells. These two types are known as the Plante and Faure.

The Plante plate is made by taking a sheet of lead and preparing its surface so that a large area is exposed and then oxidizing this surface into lead peroxide by treating the plate chemically or by means of an electric current, thus forming the positive plates. The negative plates are formed by taking the peroxide plates and connecting them as the cathodes with lead sheets as the anodes, in a solution of diluted sulphuric acid, and passing a current from one plate to the other from an outside source. The hydrogen set free from the acid combines with the oxygen of the lead peroxide and reduces the lead peroxide to spongy lead. This process results in a thin layer of active material being formed on the surface of the plate which is quite porous and firmly attached to the grid. The area of the surface of the lead plates may be increased by cutting a large number of narrow grooves in their surface or by corrugating the plates. In one particular type of construction for stationary batteries the area of the plates is increased by forming buttons of narrow strips of corrugated pure lead ribbon and forcing them into circular openings in the framework.

The Plante type of grid is usually used where weight and space are of no great importance and for this reason they are not used to any great extent in motor car work.

In the Faure plate, the active material, instead of being formed by chemical action or by the action of an electric current, as in the case of the Plante plate, is formed by introducing a paste of active material, formed principally from compounds of lead mixed with a weak solution of sulphuric acid and water, into openings in the grid. The composition of this paste or active material as used by the different companies may be quite different and it is also quite different for different types of cells in order that the finished plate may be made compact, porous and at the same time not readily crumble away. This type of plate is usually spoken of as the pasted plate, and it is used chiefly where it is desired to obtain the greatest possible capacity with a minimum of weight and space occupied. This type of lead plate is used more than any other type in motor car work.

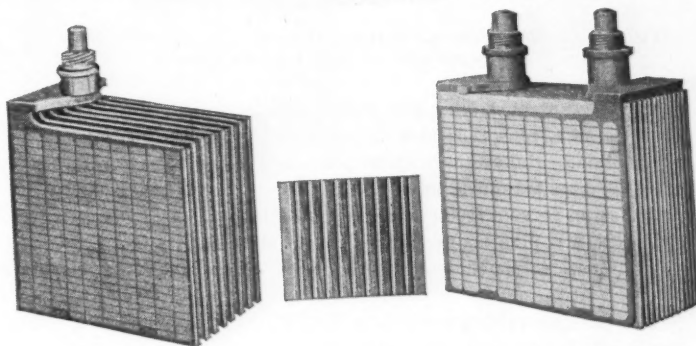
Chemical Action Within a Storage Cell When Discharging

In discharging a storage cell the electrolyte H_2SO_4 is split up by the action of the electric current into hydrogen, H_2 , and sulphurion, SO_4 . The hydrogen, which passes in the direction of the current, is liberated at the cathode and combines with some of the oxygen in the lead peroxide forming water, H_2O , thus converting the lead peroxide into lead oxide, PbO . The lead oxide is supposed to combine immediately with a part of the electrolyte, H_2SO_4 , forming lead sulphate, $PbSO_4$, and water, H_2O . Lead sulphate is also formed at the anode by the sulphurion, SO_4 , combining with the spongy lead, Pb . The cell will continue to deliver current until the plates are entirely reduced to lead sulphate, when all action will cease, as there is but one kind of material in contact with the electrolyte and a cell requires two kinds. In practice, however, the practical limit of discharge is reached before the surfaces of both plates are reduced to the same material.

The lead sulphate which is formed during the process of discharging is more bulky than the active materials themselves, and, as a result, there is an expansion in the surface of the plates of the cell. The lead sulphate has a higher electrical resistance than the active materials, which causes the internal resistance of the cell to increase as the discharge continues. There is also a decrease in the density of the electrolyte as the discharge continues on account of the absorption of the sulphurion, SO_4 , by the active material.

The chemical action taking place in a lead storage cell when it

is discharging is shown diagrammatically in Fig. 55. The direction of the current within the cell is from the negative plate whose active material is spongy lead, Pb , toward the positive plate whose active material is lead peroxide, PbO_2 . The sulphuric acid in contact with the negative plate is broken up into SO_4 and H_2 , and the positively charged hydrogen, H_2 , carries its charge over to the lead peroxide plate where it gives it up and combines with the oxygen of the lead peroxide forming water. The SO_4 part of the acid in contact with the negative plate combines with the spongy lead and forms lead sulphate, $PbSO_4$. The acid in contact with the positive plate is also broken up into SO_4 and H_2 , and a part of the oxygen in the lead oxide combines with the hydrogen,



Figs. 57 and 58—A group of plates for a storage cell, at left; a separator, center, and an element, consisting of a group of positive plates, a group of negative plates and their separators, at right

H_2 , forming more water, H_2O . The sulphurion, SO_4 , instead of going over to the negative plate combines with the lead of the lead peroxide to form lead sulphate, $PbSO_4$.

The chemical action may be written in the form of an equation as follows:

Action at positive plate, cell discharging

PbO_2 plus H_2 plus H_2SO_4 produces $PbSO_4$ plus H_2O

Lead peroxide plus hydrogen plus sulphuric acid produces lead sulphate plus water

Action at negative plate, cell discharging

Pb plus SO_4 produces $PbSO_4$

Lead plus sulphurion produces lead sulphate

There are two things which are taking place when the cell is discharging. First, the acid is continually growing weaker and, second, the active materials, lead peroxide and spongy lead, are being replaced by lead sulphate. This lead sulphate is more bulky than the active materials which it replaces and as a result the pores in the surface of the plates become more or less filled, which to a certain extent prevents the acid and active materials coming into contact with each other.

Chemical Action When Charging

In charging a storage cell, a chemical action takes place which is just the reverse of the chemical action taking place when the cell is discharging. The lead sulphate, $PbSO_4$, on the positive plate is converted back into peroxide of lead, PbO_2 ; while the lead sulphate on the negative plate is converted back into spongy lead. The density of the electrolyte increases, due to the fact that the SO_4 part of the lead sulphate combines with hydrogen and forms sulphuric acid.

The chemical action taking place in a lead storage cell when it is being charged is shown diagrammatically in Fig. 56. The direction of the current within the cell is from the positive toward the negative plate. Two parts of oxygen combine with the lead part of the lead sulphate in the positive plate and form lead peroxide, PbO_2 . The SO_4 part of the lead sulphate on the positive plate combines with two parts of hydrogen and form sulphuric acid. Two parts of hydrogen combine with the SO_4 part of the lead sulphate on the negative plate and form sulphuric acid; while the lead part of the lead sulphate on the negative plate remains on the surface of the plate as the active material.

The chemical action may be written in the form of an equation as follows:

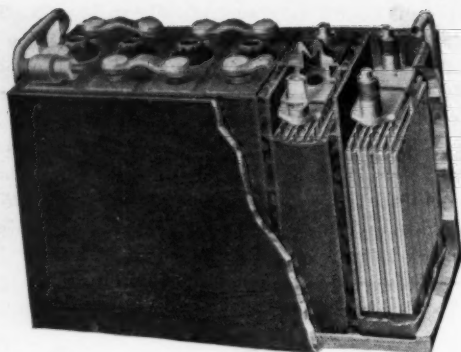


Fig. 59—A 12-volt storage battery, showing how the cells are arranged and the plates within them

Action at positive plate, cell charging

PbSO_4 plus H_2O plus O produces PbO_2 plus H_2SO_4

Lead sulphate plus water plus oxygen produces lead peroxide plus sulphuric acid

Action at negative plate, cell charging

PbSO_4 plus H_2 produces Pb plus H_2SO_4

Lead sulphate plus hydrogen produces lead plus sulphuric acid

The changes taking place in a lead storage cell when it is charging result in the lead sulphate on the positive plate being replaced by lead peroxide, the lead sulphate on the negative plate being replaced by pure lead and the electrolyte becoming stronger.

Arrangement of Plates in a Lead Storage Cell

Every storage cell contains two kinds of plates, positive and negative. In some very small cells there are only two plates, one positive and one negative. In the majority of cases, however, there are a number of both positive and negative plates, and they are arranged alternately with respect to each other. All of the positive plates are connected to lead bars which form the positive terminal of the cell, and all of the negative plates are connected to lead bars which form the negative terminal. Since there is a greater chemical action taking place at the surface of the positive plate than is taking place at the surface of the negative plate, it is customary to arrange the plates so that there is a negative plate on both sides of each positive plate, which results in practically the same action taking place on both sides of every positive plate. With this arrangement, there will be required one more negative plate in a cell than there are positive plates.

The plates are prevented from coming into contact with each other by means of what are called *separators*, which are generally made from wood, treated to remove all acids and other injurious matter. Other materials are used in the construction of separators, the principal one of which is rubber, but not to anything like the extent that wood is used. In some makes of cells the plates are held apart by means of special mechanical devices. The separators are made quite thin and they are usually ribbed vertically on one side. The ribbed side is placed next to the positive plate which readily permits the comparatively large amount of active material which is loosened from the surface of the plate during the operation of the cell to fall to the bottom of the cell.

A complete set of positive or negative plates fastened to a bar or strap of lead is called a *group*, and it will be spoken of as a positive or negative group depending upon whether the plates are positive or negative. A group of plates is shown in Fig. 57.

A combination of a positive and a negative group of plates together with the separators constitute what is called an *element*. A complete element for a starting and lighting battery is shown in Fig. 58.

Containers for Lead Storage Cells

The container for a storage cell is the vessel containing the electrolyte and into which the element of the cell is placed. The container should always be made from a material that is not acted upon by the electrolyte and its mechanical characteristics should be such that it will withstand the excessive vibration of the motor car and ordinary abuse in handling. Rubber is generally used in

the construction of the container for storage cells to be used on motor cars as it readily meets the above requirements.

The container is usually constructed with stiff ribs across the bottom and on the inside which serve to support the element and at the same time provide a space below the element into which any sediment or loose material resulting from the operation of the cell may accumulate.

The containing case is usually provided with a suitable cover which is sealed into position after the element has been put in place by means of some kind of a pitch compound. Special means are employed by the different companies in making a tight seal around the top of the cell and terminals of the groups where they pass through the cover of the cell.

Each cell must be provided with a suitable vent through which the gas formed during the operation of the cell may escape, and through which the electrolyte may be poured into the cell and electrolyte or distilled water added as may be required from time to time.

The various cells forming the storage battery are arranged in a substantial wooden box thoroughly coated with an acid-proof paint and provided with suitable handles for carrying the battery and also for anchoring it in position on the car. In the majority

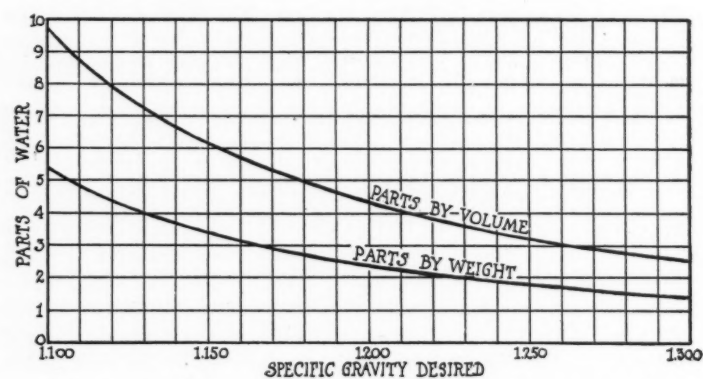


Fig. 60—Proportions of water and sulphuric acid to use to make electrolyte of any desired specific gravity. The upper curve gives the parts by volume, quarts or pints, and the lower one, the parts by weight, pounds or ounces

of cases a layer of sealing compound is placed over the entire number of cells after they are all in place in the containing case, while in some makes the sealing of each individual cell is ample to prevent any seeping of the electrolyte out into the wooden box. When the sealing of each cell is entirely separate, it is possible to remove any one of the cells from the battery for inspection or repairs a great deal easier than it is where the entire battery is covered with a layer of sealing compound. The arrangement of the various parts of a complete storage battery is shown in Fig. 59, a part being cut away so as to show the interior.

Electrolyte for Lead Storage Batteries

The electrolyte for lead storage batteries consists of pure sulphuric acid and water. Concentrated sulphuric acid is a heavy, oily liquid having a specific gravity of about 1.835. This acid is diluted with water until its gravity is in the neighborhood of 1.270 to 1.300 for a fully charged battery, as the best results are obtained in the operation of the battery with acid of this gravity.

By the term specific gravity is meant the relative weight of any substance as compared to water. Pure water is taken as a standard and its specific gravity is taken as 1 usually written 1.000 and spoken of as ten hundred. Thus, if you were to weigh a certain volume of water and then weigh an exactly equal volume of some other material, the specific gravity of the material would be equal to the weight of the volume of that material divided by the weight of the same volume of water.

The specific gravity of a material is not constant but will change with a change in temperature. If the temperature of sulphuric acid is increased there will be an increase in the volume of the acid, and although there will be no change in the strength of the acid due to heating, the expansion will cause it to have a lower

specific gravity at the higher temperature. The decrease in specific gravity is approximately equal to .001 for each 3 degrees Fahrenheit increase in temperature. For example, if the electrolyte in a battery has a specific gravity of 1,270 at 70 degrees Fahrenheit and the temperature of the electrolyte is increased to 73 degrees Fahrenheit, this increase in temperature will cause the electrolyte to expand and the gravity will decrease from 1,270 to 1,269. If the temperature of the electrolyte had decreased instead of increasing, the electrolyte would have contracted in volume and the gravity would have increased. Owing to the fact that a change in the temperature of the electrolyte does not change the strength of the electrolyte but changes its specific gravity only, there should be a correction made in the gravity readings of 1 point for each 3 degrees change in temperature. Just as a matter of convenience, 70 degrees Fahrenheit is taken as a standard temperature.

The electrolyte may be prepared so that it will have any desired density by combining definite portions of water and acid either by weight or volume, as indicated in Fig. 60. The following precautions should always be observed in mixing the electrolyte:

Use a glass or earthenware vessel, under no conditions use a metal one. Always pour the acid into the water, never pour the water into the acid. Stir the liquid constantly, while mixing with a wooden paddle or glass tube and allow it to cool before taking a reading of the specific gravity or before placing it in the cells.

The specific gravity of the electrolyte may be determined by means of a device called a hydrometer. This consists of a closed glass tube with a small quantity of lead shot or other heavy material sealed in one end, which serves to keep the tube in an upright position when it is placed in the liquid, and provided with a suitable scale marked on the glass tube or on a piece of paper inside the tube. The depth to which the hydrometer sinks in the liquid, whose specific gravity is being determined, as indicated on the scale of the instrument where the surface of the liquid is in contact with the tube, is a measure of the specific gravity of the liquid. The temperature of the electrolyte may be determined by means of a thermometer and corrections made in the specific gravity as has been explained above.

For convenience in using the hydrometer, it is usually placed

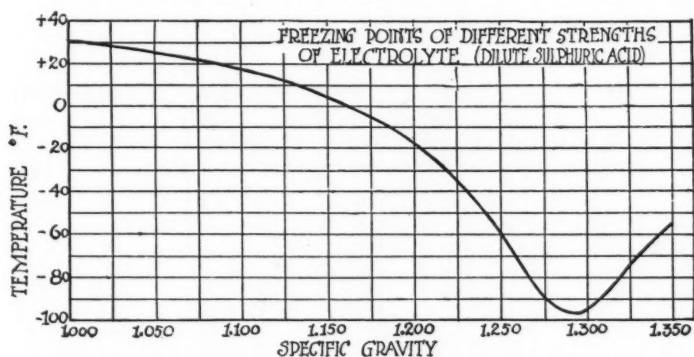


Fig. 62—Temperature at which electrolyte will freeze. Note that up to a specific gravity of 1,300, the greater the specific gravity, the lower the freezing point

inside of a larger glass tube provided with a rubber bulb at one end and a suitable nozzle or short piece of hose at the other. This combination is known as the hydrometer syringe, and is shown complete in Fig. 61. If the bulb be squeezed and the lower end inserted into the electrolyte through the vent opening of the cell, electrolyte will be drawn up into the large glass tube when the bulb is released. It will of course be necessary to draw up sufficient electrolyte to float the hydrometer. The specific gravity should be read at the surface of the electrolyte when the syringe is in a vertical position and there is no pressure on the bulb.

Care should be exercised in returning the electrolyte to the cell to make sure that it is not drawn from one cell and returned to another, which would result in the electrolyte in one cell being weakened as water eventually would be put in to replace the electrolyte, while in the cell to which the electrolyte was transferred there would be an increase in specific gravity.

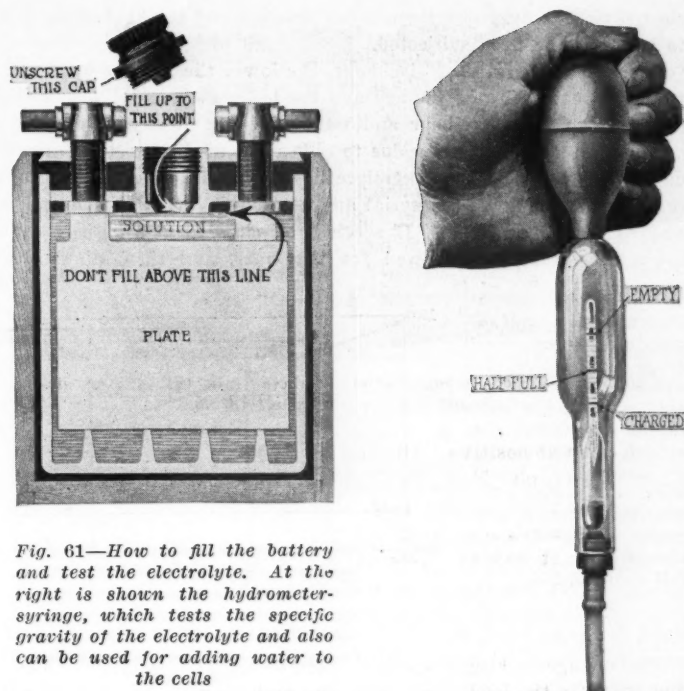


Fig. 61—How to fill the battery and test the electrolyte. At the right is shown the hydrometer-syringe, which tests the specific gravity of the electrolyte and also can be used for adding water to the cells

The temperature at which sulphuric acid freezes depends upon the specific gravity. The relation between the temperature at which the electrolyte will freeze and its specific gravity is shown by means of a curve in Fig. 62. It is readily seen from an inspection of this curve that there is little danger of the electrolyte freezing unless the battery is discharged, in which case the specific gravity will be relatively low.

The specific gravity of the electrolyte in a cell will change when the cell is being charged and discharged, increasing while the cell is being charged and decreasing when the cell is being discharged. This change in the specific gravity of the electrolyte offers quite a reliable means of determining the condition of charge of the cell. Assuming the electrolyte has a specific gravity approximately 1,300 when the cell is fully charged, the specific gravity will drop as indicated in Fig. 63 as the cell discharges.

Ampere-Hour and Watt-Hour Capacity of a Storage Cell

The normal ampere-hour capacity of a storage cell is equal to the quantity of electricity in ampere-hours that the cell will supply when it is discharged at such a constant current that the terminal voltage of the cell will fall to 1.7 volts, in 8 hours. For example, a cell is said to have an ampere-hour capacity of 60 ampere-hours, which means that the cell will supply a current of 7.5 amperes continuously for 8 hours at 70 degrees Fahrenheit without the terminal voltage decreasing below 1.7 volts. The ampere-hour capacity of a battery formed of a number of cells connected in series will be the same as the ampere-hour capacity of a single cell, but the pressure producing the current will be equal to the pressure of a single cell multiplied by the number of cells. If the cells be connected in parallel, the ampere-hour capacity of the battery will be equal to the ampere-hour capacity of a single cell multiplied by the number of cells, but the pressure producing the current will be equal to the pressure of a single cell. The ampere-hour capacity of each cell depends upon the total area of the plates exposed to the action of the electrolyte.

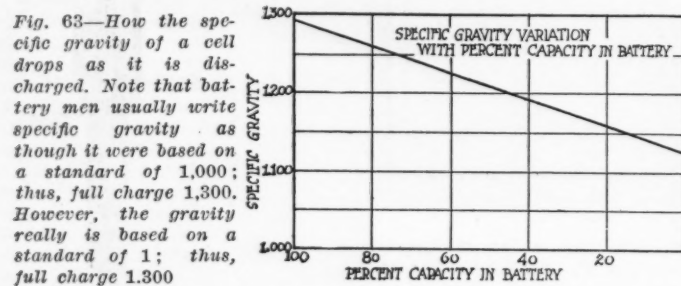
The watt-hour capacity of a storage cell is equal to the ampere-hour capacity multiplied by the average voltage during discharge. The watt-hour capacity of any number of cells connected in parallel or series will be equal to the watt-hour capacity of a single cell multiplied by the number of cells connected in circuit, assuming they are all identical.

The capacity of a given storage cell is not constant but depends upon a number of conditions, such as the temperature of the cell, the rate at which the cell is discharged, the specific gravity of the

electrolyte, the attention the cell has received and the kind of service to which it has been subjected.

The higher the rate of discharge, the lower the ampere-hour and watt-hour capacities of the cell and the lower the rate of discharge, the higher the ampere-hour and watt-hour capacities of the cell.

This decrease in capacity due to high rates of discharge is largely due to the fact that the electrolyte has not ample time to penetrate the pores of the active material and as a result, some of the active material is not available. If a cell be discharged at a high rate to the minimum voltage allowed for that rate, and then allowed to



stand for some time, it will be capable of delivering an additional quantity. Thus, a storage battery may appear to be completely exhausted when it has been used in operating the starting motor for a considerable time and it will not even operate the lamps at a reasonable voltage, but if allowed to stand unused for some time, an additional capacity may be drawn from the battery at approximately normal voltage.

The capacity of a cell varies a great deal, due to a change in temperature. There is a very marked decrease in the ampere-hour capacity with a decrease in temperature. The battery acts as though it were numbed, due to the cold, and unable to make the same effort that it does at normal temperature. The capacity of the battery will return when its temperature is returned to normal. On account of this decrease in capacity, due to a decrease in temperature, it is always advisable to keep the battery fully charged during the winter or cold months, in order that it be capable of delivering ample energy to meet the requirements. High temperatures are harmful to the life of a storage battery and should always be avoided where it is possible to do so. The high temperature in the cell is usually due to an abnormal condition, and an inspection of the battery and system in which it is connected should be made in order to locate the cause of the trouble. If the high temperature is allowed to continue it will distort the plate, permanently injure the wood separators, and more than likely soften the rubber jars and tops to such an extent that they may be seriously distorted.

The Edison Storage Battery

The alkaline storage battery as developed by Thomas A. Edison is radically different in principle, material and design from the lead types of batteries, described in the preceding section. In the first place it contains no acid of any kind and no lead plates are used. Instead, there is used a solution of potassium hydrate in water for the liquid, with nickel hydrate and iron oxide as the active material. The nickel hydrate is the active material of the positive plate. It is held in nickel-plated perforated steel tubes which are fastened in a nickel-plated steel grid. The negative active material, iron oxide, is held in nickel-plated perforated steel pockets fastened in similar grids. The active material cannot get out into the solution but the solution can get into the perforations. These elements are

placed in a container made of steel and are assembled in positive and negative groups by means of threaded steel rods which pass through holes in one corner of the plates and insulating washers. The complete element stands on rubber bridges on the bottom of the container and is kept from the sides of the container by hard rubber spaces. The average voltage during discharge is 1.2 volts per cell, and is not as constant as is the case with the lead battery, the voltage of which may be nearly double that of the Edison battery. For 6-volt ignition and lighting service five cells are used, and an Edison 6.5 volt battery used for ignition or lighting may be charged completely in 10 hours. An interior view of one of the cells with the different parts indicated is shown in Fig. 64.

Features of the Edison battery, which are advantages, are the fact that overcharging at the normal rate has no harmful effect, and that it can be charged at a rate very much higher than normal without ill effects. This latter charging at a high rate is called boosting.

Another feature in which the alkaline battery is superior to the lead type is that it will not be damaged by complete discharge nor will it be injured if allowed to stand indefinitely in the discharged condition. It has been found well adapted for ignition and lighting, but at present is not used to any extent for starting purposes, because it has a rather high internal resistance which limits its current output on high discharge rates. Occasional filling with distilled water is required to replace loss by evaporation and gases.

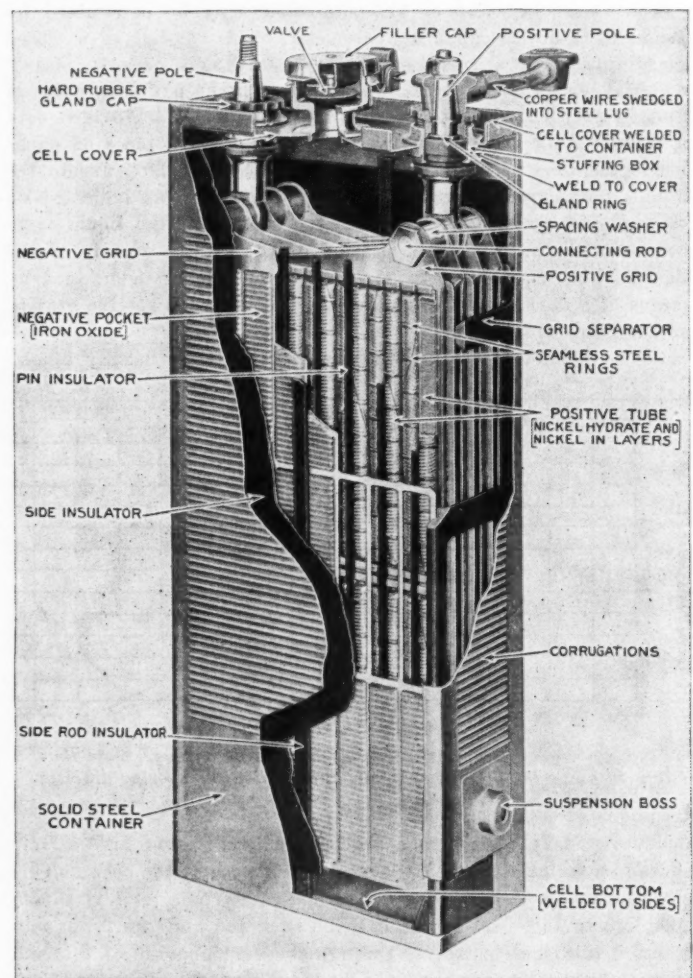


Fig. 64—Interior of an Edison cell, showing its makeup

NEXT WEEK

Part VIII of Electrical Equipment of the Motor Car will explain the care and maintenance of storage batteries and the best methods of charging them

Australian Car Market Little Affected by War

Financial Conditions Approximately 95 Per Cent of Normal

NEW YORK, July 24—Financial conditions in all of Australia are approximately 95 per cent of normal, according to Peter McIntosh, of McIntosh & Sons, Ltd., Sydney, who has been visiting in this country for several months. In spite of the war Australia is enjoying more than ordinary prosperity, largely due to war time prices being paid for so many of her natural products, such as grains, meats, wool, etc.

High Freight Rates

Motor car business is suffering more or less because of the high ocean freight rates and the inability to get ships as well as to the high price of gasoline. Australia has between 60,000 and 70,000 cars. Approximately 20,000 were sold during 1915. As in America, 70 per cent of the cars sold in Australia are going to the farmers. The term "farmer" must be interpreted somewhat differently than in this country. Many of the Australian farmers are large property owners and have huge herds of live stock. Others are engaged solely in mixed farming. Ford is the biggest seller and is followed by Overland, Buick, Studebaker, Dodge, Chevrolet, Maxwell and others.

Due to the fact that gasoline is selling wholesale at Australian seaports at 60 cents per gallon—the imperial gallon is used—it is necessary to talk gasoline economy in making sales, and those dealers engaging in quantity business must be capable of showing 23 to 30 miles per imperial

gallon. Imperial gallon is approximately one-sixth larger than the gallon used in this country. All of the gasoline used comes from the island of Borneo and is handled in 5-gallon cans with two cans crated together. This method of handling is expensive and there is a movement on hand to introduce the bulk system used in U. S. A.

Lubricating oils are much more expensive than here. The price in such cities as Sydney, Melbourne, Adelaide, Brisbane, Newcastle and Perth, averages \$1.50 per gallon as compared with 50 cents here.

Australia is not a car manufacturing country, but has made much progress in the manufacture of pneumatic tires and also motor car bodies. The three tire factories employ from 3,000 to 4,000 men and are producing upwards of 2,500 pneumatic tires per day, which is sufficient to care for practically all of the cars in the country. Tires sell for approximately twice as much as they do in North America. Because of the manufacture of tires in Australia, the majority of the Australian dealers buy their cars from the United States without tires, this being to develop the tire business in Australia and assist the three tire factories there.

The majority of Overland and Cadillac cars, however, are shipped with tires. Australia uses metric sizes, and the majority of tires are clincher type. Some straight-side types are being introduced into Australia, but there seems to be a preference

for the clincher type, a condition naturally favored by the Australian manufacturers. One of the tire factories is the Dunlop, which is a branch of the English company; the other two are local organizations.

Body building in Australia is an important industry and is a development of the old carriage trade. The government has recognized this body-building industry and is protecting the local manufacturers by a heavy import duty. The present duty on a five-passenger body is \$125. Because of the local body-building industry many Australian dealers prefer to buy stripped chassis in U. S. A. and have bodies fitted in Melbourne or Sydney, where the body-building interests are centered. A good five-passenger body costs approximately \$450 in these cities. There is not much economy in having the body built as compared with buying the chassis fitted with the standard factory body. In purchasing chassis without bodies from the American manufacturers, approximately 50 per cent of the real cost of the body is generally remitted by the manufacturer.

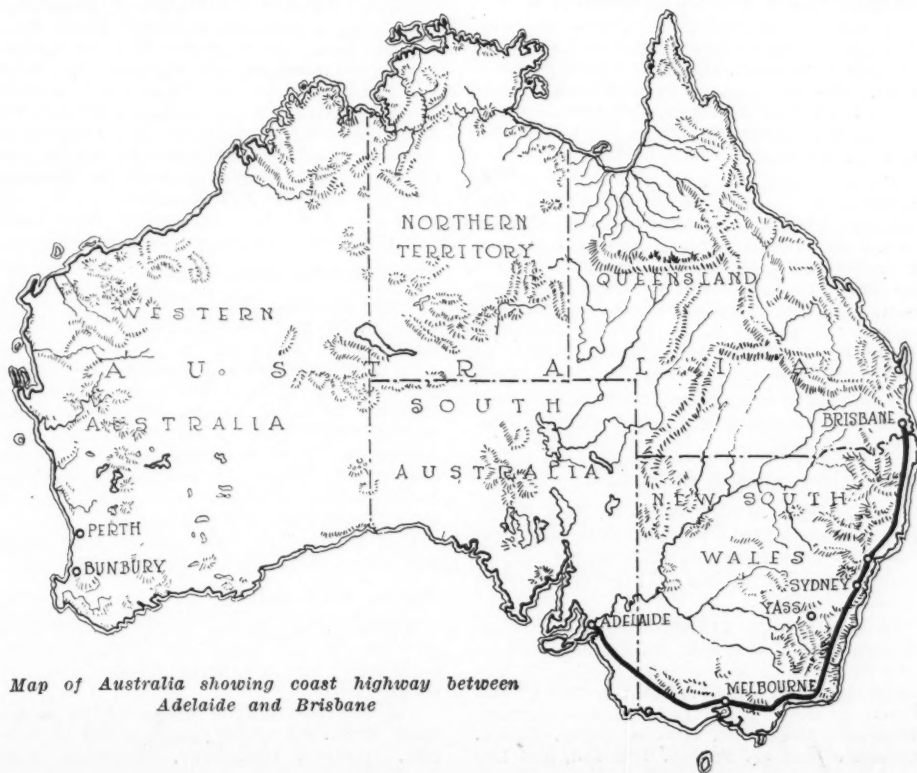
Australian dealers and garagemen are generally well fitted to handle all matters with regard to car repairs, etc. When electric lighting and starting were introduced there was some difficulty at the start in obtaining efficient help, but the work of the Delco company in having its representatives visit all Australian cities for the purpose of educating dealers and garagemen in caring for such apparatus helped very materially. It is not now difficult to obtain good electrical experts, who generally are of French or Swiss parentage.

Battery Question Troubles

During the past season, the battery question has been giving more trouble than perhaps any other and it is not yet settled. Australia has a climate which is severe on batteries in that the summer is particularly hot, and with a temperature of 125 degrees Fahrenheit in the interior during the summer months of December, January and February, there has been more or less trouble with plates warping from the heat so that positives and negatives squeeze the separator and form a short circuit. In the coast cities such as Sydney, the summer temperature rarely rises above 80 degrees so that there is no difficulty in such places.

Some of the battery manufacturers are improving their batteries by extending the separators a certain distance below the plates, thereby making it impossible for the bending of the plates to bring positives and negatives together and cause short-circuiting.

The major complaint that many Australian dealers have with regard to batteries for starting and lighting is the lack



Map of Australia showing coast highway between Adelaide and Brisbane

of standardization, particularly in terminals, which makes it difficult to meet all the exigencies. With the present lack of standardization it requires about forty different models of batteries to care for all of the different American cars in Australia, so that any Sydney or Melbourne dealer or supply house aiming to be ready to meet any exigency in the battery field would have to be stocked to that extent. It has been suggested that if greater standardization of terminals were accomplished that four or six different models would suffice. This would make it much easier for the supply man in Australian cities.

Mr. McIntosh, when speaking on this subject, said:

Too Many Sizes

"There are three sizes of batteries that would serve at least sixty or seventy makes of U. S. A. cars, and after close investigation there are not three different makes out of this number that would be connected up to any one battery model without making alterations in terminals or connections. If standardization were carried out a dealer or service department in a foreign country would replace the battery of almost any U. S. A. car out of a stock of four sizes. As matters stand today it requires a stock of forty different battery models and then the dealer is not absolutely certain that he can do it."

Australia as a motor car market is going to increase. At present it has been absorbing cars at a satisfactory rate in proportion to the population. With a population of 5,000,000 it has, say, 70,000 cars. On this ratio with a population of 105,000,000, which is the same as that of the U. S. A., it would have 1,470,000 cars. Australia's ratio of cars to population is thus scarcely one-half of that of the United States.

Australia has a particularly homogeneous population. Colored races have largely been barred, and it is due to such prohibition that the population of the continent is not higher. With its present almost pure white population the buying capacity is higher than it ordinarily would be with heavily mixed races. There are islands in the Pacific ocean with populations of 30,000,000 but which cannot be compared with Australia in purchasing capacity.

Australia has not yet taken up the road-building movement as it should. There are approximately 1,800 miles of substantially improved highways. Between Sydney and Melbourne, a distance of 600 miles, there is a good road. These cities have populations of 800,000 and 700,000 respectively. From Melbourne to Adelaide, another stretch of 600 miles, there is a good road. The population of Adelaide is 200,000. From Sydney to Brisbane, 600 miles, is another good macadam road. Brisbane's population is 150,000.

These three links of roads are all connected in the form of a huge crescent as these four cities are located in the southeastern part of the continent, and starting

from the left-hand side of the crescent and going to the right hand the cities in order are Adelaide, Melbourne, Sydney and Brisbane. All are seaport places. All of this 1,800 miles of highway was built some years ago and, owing to the present government system of roads, improvement has not been rapid since that date. The motorists are working for improved systems so that trunk highways will be extended into the interior. Considering the present road system in Australia and the population of the continent, the sale of cars has been particularly heavy.

The United States car manufacturer may find difficulty in realizing the cost to which the Australian dealer is put because of ocean freights, import duties, etc. Take a typical United States car that would retail in this country for \$750. It costs approximately the same amount to get this car into the dealer's salesroom in Melbourne or Sydney. Some of the major items are freight from New York to Melbourne or Sydney, freight from the factory to New York, packing at the factory, duties of various sorts, etc. The following tabulation gives some conception of these expenses:

Packing at factory.....	\$ 26.00
Freight, factory to New York.....	30.00
Freight, New York to Melbourne.....	320.00
Duty on body.....	125.00
Chassis duty, 10 percent.....	50.00
Tires, 60 cents a pound.....	50.40
Duty, lamps and accessories.....	28.00
Duty, top and windshield.....	30.00
Exchange, commission, insurance, etc..	70.00

The question of exchange, commission,

insurance, etc., is one that is generally little understood with American dealers as they have not to bother with it. It costs approximately 2½ per cent for conversion from United States currency into Australian; that is, the Australian dealer pays approximately this much on his bill. In addition, exchange costs 2½ per cent between Melbourne or Sydney and New York. Marine insurance costs approximately 2 per cent. If the Australian dealer operates through a New York shipping house or exporter he pays 2½ per cent for his service. All told there is 10 per cent added because of these four items. It is possible to eliminate the 2½ per cent commission to the exporter if the Australian dealer can do his business direct with the United States factory. Quite frequently Australian dealers complain regarding the poor business systems of the factories with regard to foreign shipments.

Freights have gone up very materially on the ocean because of the war. Before the war freights were \$8 per cubic ton and since the war they have risen to \$40 and \$45. During the past few days there has been a reduction of approximately \$10 per cubic ton. A cubic ton is equivalent to 40 cubic feet and a medium priced car selling around \$800 occupies approximately 9-ton space or 360 cubic feet. Freight rates from Liverpool to Sydney before the war were 8 per cubic ton and are now \$30. These figures apply, of course, to motor car shipments.

Routes and Touring Information

Chicago-Denver, Colo.

L AFAYETTE, IND.—Editor Motor Age—Kindly give me the best routing from Chicago to Denver.—D. B. Gushwa.

In going from Chicago to Denver the best routing to follow at present is to go out to Geneva, DeKalb, Rochelle, Dixon, Sterling, Galt, Hillsdale, Moline, Rock Island, Davenport, Iowa City, Marengo, Grinnell, Newton, Colfax, Des Moines, Earlham, Adair, Atlantic, Council Bluffs, Omaha.

From Omaha you have the choice of two routings to Denver. One is to follow the Lincoln Highway through Fremont, Columbus, Grand Island, Gibbon, Kearney, Lexington, North Platte, to Big Springs and then go south to Julesburg, Sterling, Fort Morgan, and Greeley into Denver; or, you can follow the O. L. D. to Lincoln, Harvard, Hastings, McCook, to Sterling and then as above to Denver.

Volume 5 of the Automobile Blue Book will give you complete running directions over either routing.

Shenandoah, Ia.-Los Angeles, Cal.

Shenandoah, Ia.—Editor Motor Age—Kindly give me the best routing for a trip from Shenandoah, Ia., to Los Angeles. Expect to start about the middle of September.—Rev. T. McGlumphey.

In going from Shenandoah, Ia., to Los Angeles, Cal., the best routing for you to use would be to go down to St. Joseph and then you could either follow the Pike's Peak Ocean to Ocean highway going west through Hiawatha, Belleville, Norton, Colby, Limon, Colorado Springs, Pueblo, Trinidad, and Las

Vegas, to Santa Fe; or, you can go to St. Joseph, down to Kansas City, and pick up the Santa Fe trail going through Emporia, Florence, Newton, Hutchinson, Lyons, Ellinwood, Dodge City, Syracuse, La Junta, then over to Trinidad and then Santa Fe.

From Santa Fe go down to Albuquerque, Socorro, Magdalena, and Springerville. Here you have two routings, either going through Globe, and Phoenix, to Yuma, El Centro and San Diego and then up to Los Angeles, or you can go from Springerville up to the Grand Canyon and then through the Needles-Barstow route to Los Angeles.

Volume 5 of the Automobile Blue Book will give you complete running directions.

Grand Rapids, Mich.-Chicago

Grand Rapids, Mich.—Editor Motor Age—Kindly give me the best route from Grand Rapids to Chicago.—J. F. Cramer.

In going from Grand Rapids to Chicago, the best routing to follow is to go south to Corinth, Bradley, Martin, Plainwell, Kalamazoo, then west to Lawrence, Hartford, Watervliet, Coloma, Riverside, St. Joseph, Stevensville, Brookman, Sawyer, Three Oaks, New Buffalo, Michigan City, Gary, South Gary, Highlands, and Hammond.

Volume 4 of the Automobile Blue Book will give you complete running directions.

Wayne, Nebr.-Denver, Colo.

Wayne, Neb.—Editor Motor Age—Kindly give me the best route from Wayne, Nebr., to Denver, via Longmont, Colo.—LeRoy D. Owen.

In going from Wayne to Denver, via Longmont, Colo., we advise you go south to Norfolk, Madison, Humphrey, Columbus, west

through Silver Creek, Central City, Grand Island, Kearney, Lexington, Gothenburg, North Platte, Ogallala, Big Springs, Julesburg, Sterling, Fort Morgan, Greeley, Loveland, Longmont, Lafayette to Denver.

Volume 5 of the Automobile Blue Book will give you complete routing. You can procure this from the Automobile Blue Book Publishing Co., Malters Building, Chicago.

Pine Bluff, Ark.-Reform, Ala.

Tarry, Ark.—Editor Motor Age—Kindly give me the best route from Pine Bluff, Ark., to Reform, Ala.—J. D. Cogbill.

In going from Pine Bluff, Ark., to Reform, Ala., advise that you go through Noble Lake, Grady, Vannon, Gould, Rotan, Reedville, Winchester, Arkansas City, Greenville, Elizabeth, Holly Ridge, Indianola, Moorhead, Itta Bena, Fort Loring, Greenwood, Caddo, Carrollton, Winona, Sibley, Stewart, Chester, Ackerman, Louisville, Singleton, Brooksville, Cliftonville, Pickensville, Carrollton, then north to Reform.

Torrington, Wyo.-Newton, Kan.

Sedgwick, Kan.—Editor Motor Age—Kindly give me the best route from Torrington, Wyo., to Newton, Kan., via Denver, Colo. Desire to make this trip about November 1.—George Knowlton.

In going from Torrington, Wyo., to Newton, Kan., there are several ways to make the trip. Advise going over to Wheatland, then to Cheyenne, Greeley, and Brighton to Denver.

From Denver to Newton, you can go by way of Limon, Colby, Wilson, Salina and McPherson; or you can go south to Colorado Springs, Pueblo, then pick up the Santa Fe trail going through La Junta, Syracuse, Dodge City, Ellinwood, Lyons to Hutchinson, then into Newton.

Volume 5 of the Automobile Blue Book will give complete running directions.

Celina, Tex.-Oklahoma City, Okla.

Celina, Tex.—Editor Motor Age—Kindly give me the best route from Celina, Tex., to Oklahoma City, then to Indianapolis or Arapahoe, Okla., back to Temple, Okla., and then to Celina by way of Fort Worth, Tex.—J. Thomas Robinson.

From Celina suggest you go through Collinsville, Gainesville, Marietta, Ardmore, Davis, Pauls Valley, Purcell and Norman to Oklahoma City.

From Oklahoma City to Indianapolis, advise going by way of Yukon, El Reno, Calumet, Geary, Bridgeport, Hydro, Weatherford, Indianapolis to Arapahoe.

Return to Bridgeport and then go to Hinton, Binger, Anadarko, Apache, Richards, Lawton, Walter to Temple; then to Adelaide, Randlett, Blackburnett, Wichita Falls, Henrietta, Alvord, Decatur, Fort Worth, Dallas and Carrollton to Celina.

Circle Tour to Gettysburg

Muncie, Ind.—Editor Motor Age—I am thinking very much of taking trip No. 2 as outlined on the map showing the ideal touring grounds of the United States. I desire to go from Muncie to Cincinnati, then to Danville, Ky.; this part of the trip I know is all right, but what worries me is getting across from there northeast along the route as shown on Motor Age map, as far as Gettysburg, and then home by way of Pittsburgh and Columbus, O. What does Motor Age suggest after reaching Danville, Ky.? Any information you can give me regarding roads, hotels, etc., will be appreciated. Could the trip be made in 15 days?—Frank H. Hanley.

In going from Danville over to Gettysburg, the best way to get good roads is to come up to Lexington, Maysville, Washington Court House, then over to Zanesville and Wheeling. Then follow the old National road to Uniontown, Cumberland, Hagerstown, then over to Gettysburg.

For the trip you have outlined we advise

you procuring volume 4 and volume 3 of the Automobile Blue Book, which will give you complete routing through all of this territory. In addition to this it will give you information as to the best roads, historical points on the route, and good hotels and garages.

You will have no trouble at all in making a trip of this kind in 15 days. It really depends upon how fast you wish to travel and how much you wish to see.

Little Rock, Ark.-Denver, Col.

Beebe, Ark.—Editor Motor Age—Kindly give us the best route from Little Rock, Ark., to Denver, Colo.—David and Thornton.

In going from Little Rock, Ark., to Denver, the best routing for you to use would be to go to Hot Springs, Ardadelphia, Prescott, Fulton, Texarkana, Avery, Clarksville, Detroit, Paris, Bonhan, Vandalia, Anna, McKinney, Dallas, Fort Worth, Bowie, Wichita Falls, Vernon, Damsite, Childress, Goodnight, Amarillo, Dalhart, Clayton, Des Moines, Raton, Trinidad, Walsenburg, Pueblo, Colorado Springs, Castle Rock, to Denver.

Volume 5 of the Automobile Blue Book will give you complete routing for this trip.

Parsons, Kan.-Greenshields, Can.

Parsons, Kan.—Editor Motor Age—Kindly give me the best route from Parsons, Kan., to Greenshields, Alberta, Can., via Winnipeg.—George R. White.

In going up to Winnipeg and Greenshields, Alberta, we advise you going over to Channute, and then going north to Humboldt, Iola, Colony, Richmond, Ottawa, Baldwin, Globe, Scranton, Topeka, Hoyt, Holton, Horton, Hiawatha, Falls City, Nebraska City, Plattsmouth, Omaha, Blair, Tekamah, Oakland, Walthill, Homer, Sioux City, Westfield, Akron, Hudson, Canton, Sioux Falls, Dell Rapids, Brookings, Clear Lake, Ortonville, Clinton, Dumont, White Rock, Wahpeton, Christine, Hickson, Fargo, Grand Forks, Grafton, Morris, St. Norbert, Winnipeg.

From Winnipeg west advise going to Marquette, Portage la Prairie, Westbourne, Gladstone, Neepawa, Minnedosa, Basswood, Marney, Warleigh, Birtle, St. Lazare, Victor, Spy Hill, Yarbo, Atwater, Cana Melville, Hubbard, Lescock, Raymore, Nokomis, Watrous, Saskatoon, Asquith, Perdue, Vance, Wolfe, Wilkie, Swinbourne, Zumbro, Butze, Dunn, Edgerton to Greenshields.

We know of no road guide that will give you the routing west of Winnipeg, and in general you will have to follow the line of railroad travel going through Canada. Suggest that you call at the Winnipeg Automobile Club for detailed directions west of Winnipeg.

Chicago-Frankfort, Mich.

Chicago, Ill.—Editor Motor Age—Will you, at your earliest convenience, kindly send me the best route to Frankfort, Mich? Also what the letters D A and J H mean along the country roads in Indiana?—Dorothy A. Smith.

In going from Frankfort, Mich., to Chicago probably the best routing for you to follow will be the West Michigan Pike. This road has been put into pretty good condition last fall and this spring and is one of the most direct connections up.

The best routing to follow is the boulevard systems of Chicago down to Hammond, Highlands, South Gary, then north to Gary, follow the shore through Porter and Miller to Michigan City, New Buffalo, Sawyer, Stevensville, St. Joseph, Benton Harbor, Riverside, Watervliet, Covert, South Haven, Glenn, Douglas, Saugatuck, Holland, Grand Haven, Muskegon, Whitehall, Hart, Pentwater, Ludington, Manistee, Onokama, Arcadia to Frankfort.

Volume 4 of the Automobile Blue Book will give you complete routing for this trip.

The letters D A stand for Dixie air line

and the letters J H stand for Jackson highway. These two routes, however, are now one and you will find that the J H markings have superseded practically all of the D A markings.

Little Rock, Ark.-Charleston, S. C.

Little Rock, Ark.—Kindly give me the best routing from Little Rock, Ark., to Charleston or Savannah, S. C.—A. V. Walker.

In going from Little Rock to Charleston or Savannah, the most satisfactory routing to follow will be to go to Forrest City, Memphis, Brownsville, Jackson, Nashville, Huntsville, Chattanooga, Cassville, Carthersville, Atlanta, Athens, Thompson, then to Augusta. From Augusta go through Aiken, Orangeburg, Charleston, or go through Waynesboro to Savannah.

Volume 6 of the Automobile Blue Book will give you complete routing over either direction.

Jacksonville, Fla.-Lake Toxaway, N. C.

Miami, Fla.—Editor Motor Age—Kindly advise the best route from Jacksonville, Fla., to Lake Toxaway, N. C.—A. G. Holmes.

From Jacksonville to Lake Toxaway we advise that you go north to Yulee White Oak, Brunswick, Darien, Riceboro, Savannah, Springfield, Sylvania, Waynesboro, Augusta, Aiken, Batesburg, Lexington, Columbia, Little Mountain, Newberry, Clinton, Laurens, Simpsonville, Greenville, Hendersonville, Brevard, then to Lake Toxaway.

Volume 6 of the Automobile Blue Book will give running directions for this trip.

Peoria, Ill.-Marinette, Wis.

Peoria, Ill.—Editor Motor Age—Kindly publish the best route from Peoria, Ill., to Marinette, Wis., also from Peoria, Ill., to Columbus, O., giving the distances between points.—R. E. Dumon.

In going from Peoria to Marinette, Wis., the best routing is to come north to Princeton, 55 miles; Mendota, 25 miles; Rochelle, Rockford, 60 miles; Beloit, Lake Geneva, 55 miles; Eagle, Oconomowoc, Mayville, Theresa, Byron, Fond du Lac, 65 miles; Oshkosh, 20 miles; Appleton, Green Bay, 65 miles; Brookside, Oconot, Peshtigo, Marinette, 55 miles.

From Peoria to Columbus, O., there are several good ways of going. Probably the most satisfactory would be to go to Bloomington, 44 miles; Champaign, 51 miles; Danville, Covington, Crawfordville, Indianapolis, 127 miles; Greenfield, Cambridge City, Richmond, Dayton, 106 miles; Springfield, Brighton, Columbus, 68 miles.

Volume 4 of the Automobile Book will give you complete routing.

Quincy, Ill.-St. Louis, Mo.

Quincy, Ill.—Editor Motor Age—Kindly give me the best route between Quincy, Ill., and St. Louis, Mo.—Theo. F. Ehrhart.

In going from Quincy, Ill., to St. Louis, Mo., the best routing for you to use is to go to Hannibal, New London, Louisiana, Stark, Prairieville, Auburn, Troy, Flint, Wentzville, St. Charles into St. Louis.

Volume 4 of the Automobile Blue Book will give you complete running directions for this trip.

SUBWAYS FOR LINCOLN WAY

South Bend, Aug. 4—A ruling of the Indiana utilities commission regarding the construction of subways under the Lincoln Highway, near New Carlisle, where a number of fatal accidents have occurred, orders the three railways to have subways built on or before Jan. 1, 1917. The expense will be apportioned, 75 per cent against the railroads and 25 per cent against the county. Each railroad will have a separate subway.

when I lay the plugs on top of the motor all plugs fire good, but when I put the plugs in they will not fire under compression. The motor is timed correctly. What is the cause of this?—A Subscriber.

Probably the spark gaps on the plugs are too far apart. Try closing them so that the point of a table knife will just slip between and see if the trouble is not done away with.

WIRING AN OVERLAND WITH TECO

Suggest the Manufacturer Be Allowed to Submit Specifications

Saumemin, Ill.—Editor Motor Age—I would be greatly obliged if you would furnish me with a diagram showing how I could best wire my Overland 30 touring car for electric lighting. I want to use in the equipment a Teco generator, made by Tritt Electric Co., Union City, Ind., a six-volt 60-hour cutout such as was used in the 1914 Overland 35.

2—In giving the diagram please show how and where I can connect an ammeter to give proper service.—A Subscriber.

1—A wiring diagram to answer your needs is shown in Fig. 3. Undoubtedly the Tritt Electric Co. would gladly co-operate with you in deciding upon the proper location and method of fitting such an equipment. According to the maker there are different places on different cars where these chargers may be placed and they may either be driven by belt or by friction from the flywheel or by belt from an extra pulley on the magneto shaft or by belt from an extra pulley attached to the flange of the fan pulley. The manufacturers recommend the use of V pulleys and V belt or a round belt can be used if the V belt cannot be had. A flat belt will not give a positive enough drive. If a round belt is used it is recommended that nothing smaller than $\frac{1}{2}$ -inch in diameter be used. The charger will run in either direction and must be driven at a speed of from 2,500 to 3,000 revolutions per minute.

2—You will note on the diagram that provisions are made for the wiring of ammeter.

EFFECT OF LEAKY INLET VALVE

Hot Gases Passing Between Stem and Seat Will Pit Metal.

Eveleth, Minn.—Editor Motor Age—If the inlet valve of a motor does not properly close at the completion of the compression stroke, will it have any other effect than to lessen the compression and consequently decrease the power?

2—Could this possibly weaken the mixture that is thus being compressed?

3—Would this condition have a tendency to soot the plug in that cylinder?

4—I am told that you can detect a leaky valve by removing the plugs, and if one is sooted more than the others, it is an indication of a leaky valve. Is this true? Is it not the overrich mixture that soots the plugs?

5—What is the maximum speed of the Pierce Arrow 6-66, the F. R. P. raceabout, and the new Pathfinder 12?

6—What is the size of the largest motor ever employed by the Austin manufacturer?

7—What are the bore and stroke of the F. R. P.?

1—Hot exhaust gases passing between the leaky valve and its seat will tend to carbonize and pit the valve and seat, eventually ruining one or the other or both.

2—If the valve does not seat, gases will be forced back into the manifold with the result that the mixture will be weakened.

3—No.

4—A sooty plug does not indicate a

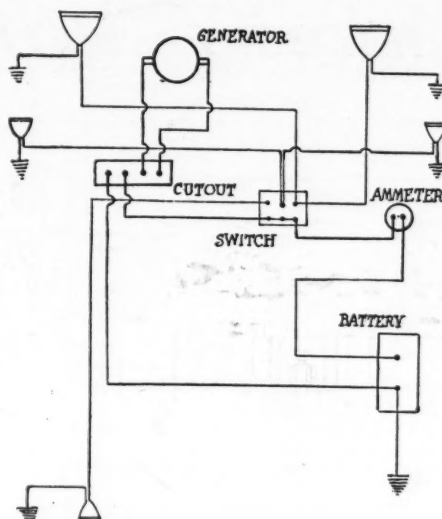


Fig. 3—Diagram showing method of wiring 1914 Overland with Teco generator

leaky valve, neither does an overrich mixture affect the plug to any great extent. The soot, most of it, comes from the lubricating oil, which is put into the crankcase. One plug sooted would be more an indication that the piston rings in the pistons of that cylinder were leaky.

5—Pierce, approximately 65 miles per hour. Pathfinder twelve, 75 miles per hour. Motor Age has no data concerning the speed of the F. R. P.

6—The Austin model 66 had a six-cylinder motor with $4\frac{1}{2}$ -inch bore and 6-inch stroke, which is the largest this company ever put out. This was a 1914 model.

7—4.6 bore by 6.75 stroke.

Hudson Wiring Diagram

Detroit, Mich.—Editor Motor Age—Kindly publish a wiring diagram of the Hudson 20 car.—J. E. Jardine.

The diagram will be found in Fig. 4.

Rotating-Sleeve Motor

Princeton, Ill.—Editor Motor Age—Kindly explain the working of the Wilmo rotating-sleeve motor. Why is it that some form of rotating valve has not been a success long ago, as it would seem possible to make it more simple than any reciprocating valve?—Wilson Yearnshaw.

A detailed description of this motor will appear in Motor Age within a few weeks. It appears that prior to this time the greatest difficulty in rotating valves has

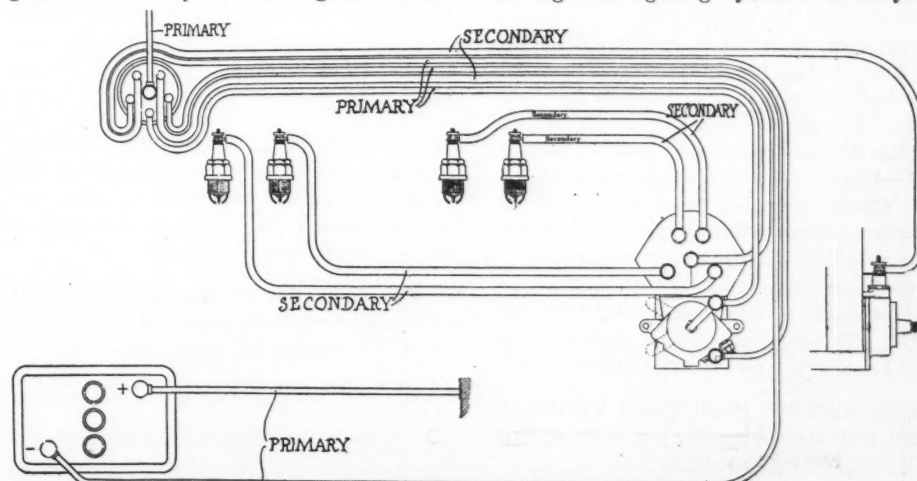


Fig. 4—Wiring of Bosch dual ignition system in Hudson 20

been in devising a method to lubricate and cool the valve cylinder efficiently.

REMEDY FOR SLIPPING CLUTCH

New Disks or Heavier Spring Necessary to Overcome Trouble

Buckhannon, W. Va.—Editor Motor Age—How does one tighten the clutch, to prevent slipping, on a 1913 Crow-Elkhart six-cylinder car?

2—What is the make of the motor used in this model?

3—What is the gear ratio on first, second and third?—Alden Beagle.

1—The clutch in this car is of the constant pressure type. If the clutch is slipping it will either be necessary to put in new disks or possibly a heavier spring.

2—The motor is either a Beaver or a Buda as the manufacturers used both makes during the 1913 season. If you will give us the serial number of the car we will be glad to tell you whether it is a Buda or a Beaver.

3—Gear ratios of the gearset are as follows: 2.07 to 1, low speed; 1.60 to 1, second speed, and third speed, 1 to 1, or direct. Reverse is 3.60 to 1. These ratios apply to the gearset. The differential is 3.50 to 1 ratio.

MAGNETO TROUBLE IN OAKLAND

Model 35 Deaco Equipment Ignited Motor Through Distributor

Erskine, Minn.—Editor Motor Age—I have a model 35 Oakland equipped with a Deaco starter and ignition system. The magneto has given out and after I discovered the trouble was in the magneto I tried everything from examining the wires to cleaning the brushes, fixing and resetting the points. The points would work loose, so I had to tighten them. I found the motor ran best when it broke about $\frac{1}{8}$ inch.

After all this adjusting the car would run well for about 1 hour, then would slow down, stop and act as if the gas line was clogged. After cleaning out the line, carburetor and tank I had the same trouble, and I have not been able to make the motor go since. I took off the magneto and examined it thoroughly, but found everything in place; tested the wires with a few bells of a telephone receiver. I got a sound every place but through the high-tension coil, which is mounted just over the breaker-box in front of the magneto. I got a sound through the left-hand brush wire to the center, but no sound at all through the right-hand wire. The coil had melted.

1—Is the coil too weak? What can be done to remedy the trouble?

2—If I have it repaired, without rewinding, will it last?

3—Would Motor Age advise installing a new system, such as the Atwater Kent or Bosch?—C. W. M.

1—In the first place you state that your Oakland model 35 is equipped with a Deaco starting and lighting system. Then you

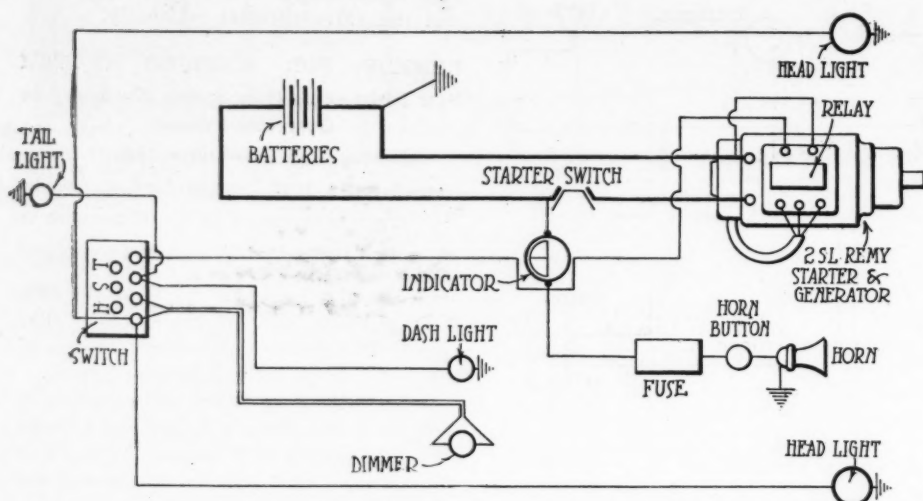


Fig. 5—Wiring diagram of model 3 Empire roadster

go on and tell about the trouble you are having with the magneto. With the Deaco system there was no magneto, ignition being from the storage battery through a distributor. We take it for granted that your car has been altered since it left the factory and a magneto fitted. We cannot give you much information without knowing what make the magneto is. However, if the coil is too weak the only remedy is a new coil.

2—Probably not.

3—For those who have experienced trouble with the Deaco system on the model 35 Oaklands, the Oakland Motor Car Co., Service Department, Pontiac, Mich., has been furnishing a Remy magneto equipment all ready to install, which is used for ignition only, the Deaco generator being used for lighting.

GEAR RATIOS OF 1911 LOCOMOBILE Five Different High Gear Selections from Service Stations

San Francisco, Cal.—Editor Motor Age—I have a 1911 four-cylinder Locomobile and would like to know how this model is geared on first, second, third, fourth and reverse.

2—What is the weight of this car with the five-passenger body that came from the factory?

3—I desire to install double ignition. Could I use a Bosch magneto, or would some other make be more suitable?

4—How could I gear this car up to 3 to 1?—Peter Viscorich.

1—The standard 1911 type L cars were geared 3.538 to 1 and the corresponding speeds are as follows: reverse, 20.000 to 1; first, 14.152 to 1; second, 6.793 to 1; third, 4.950 to 1; fourth, 3.538 to 1.

2—The approximate weight of this car with a five-passenger body is 3,300 pounds.

3—Double ignition can be installed and the factory suggests the use of a Bosch magneto, two-spark, as the most likely one to produce satisfactory results.

4—Gears have been made for this car giving ratios of 2.47, 2.687, 2.93, 3.214 and 3.917. These gears may be ordered from any Locomobile service station.

EVERLASTING PUNCTURE TROUBLE Wife Will Not Drive Car for Fear of Tire Difficulties

Portland, Ore.—Editor Motor Age—Some months ago I bought a 1914 Ford touring car which seems to be in very good condition. Has been driven about 11,000 miles.

1—Can get about 18 miles to the gallon. Would a later model Kingston do better than the one on the car?

2—If I put non-leaking rings on some pistons, should they go on all at the same time?

3—Has anyone in authority given the various gas savers now advertised a genuine test? Would it pay me to install one?

4—Why do tire companies oppose the use of substitutes for air? If they are not right, then it would seem that Motor Age is in error in accepting such advertisements. If such substitutes are hard on tires, Motor Age should be the first to say so. I have a neighbor who has run over 10,000 miles on semi-solid filler in one set of tires and he thinks it wonderful. Another neighbor took the same filler out in a month or so and threw it away. The possibility of tire troubles keeps my wife from driving alone. She can drive all right, but seeing so many people having tire troubles, she being not well enough to struggle with a damaged tire, has to let the car stand still 4 days out of each week. If Motor Age can suggest any method that will surely eliminate punctures and blowouts I will be under lasting obligations. —J. H. Zehrung.

1—A later model carbureter designed to handle the low grade of fuel which is now available would very probably increase your gasoline mileage.

2—Yes.

3—Tests are being made by a great number of owners. As many of these are being sold in constantly increasing quantities, they surely must have merit. It is up to you whether you wish to try one.

4—Because there is no real substitute for air. Anything used in its place will make a harder riding car. Tire fillers are perfectly all right for the man that is willing to sacrifice some of the easy riding qualities of his car and subject the mechanism to greater vibration for the sake of eliminating punctures. As far as mileage is concerned, we could not say whether a filler would keep the casing in as good condition as air or not. There are puncture sealers now on the market for which big claims are made. These are liquids inserted into the tube, and do not hinder the resiliency of the tire.

MOTOR SPEED IN GEAR SHIFTING In Passing from Low to Second Accelerator Should Be Released.

Storm Lake, Ia.—Editor Motor Age—Should not the 1916 Auburn, model 6-38, be capable of 60 miles per hour?

2—What is the maximum engine speed and gear ratio of this model?

3—I can get only about 11½ miles per gallon mileage. Should not a 3 by 5 motor run 14 to 18 miles per gallon?

4—Give instructions for high-speed adjustment on the Rayfield model M. The motor runs

well, can slow down and run 2 miles per hour, idles well, but it seems I should get more speed and greater mileage.

5—Is the motor in the 6-38 Auburn a Rutenber? Sometimes when I speed the motor up in low and try to shift to second the gears will not engage. If I start very slowly, do not speed the motor much in low, and shift quickly, the gears do not grind and engage easily. The clutch stops—I took the clutch plate off and watched the clutch.

6—Is graphite very beneficial in the gearset and differential?—F. F. J.

1—According to the factory the model 6-38 is not capable of 60 miles an hour.

2—The axle reduction in this model is 45/12 to 1, and the gearset reduction on low is 3.15.

3—According to the factory the gasoline consumption should be between 14 and 18 miles per gallon, and if you are not receiving this you can get a new carburetor by returning the old one to the factory.

4—To adjust the high-speed advance the spark lever one quarter of the way, open the throttle rather quickly, for a couple of seconds at a time. If the motor does not accelerate perfectly without coughing or laboring, you can obtain the proper adjustment by turning the thumb screw located directly opposite the throttle lever. Turn to the right for more gas and to the left for less.

5—The motor is a Rutenber. The clutch is supposed to stop. The opinion is given that you do not handle the shifting of gears properly. In shifting from low to second remove your foot from the accelerator and let the motor die down before making the gear change. Your statement that the gears engage easily when you make the change with low motor speed leads us to believe that you are making the mistake described above.

6—Yes.

READER HAS A SPEED MOTOR? High Speed Motor and One to Drive Car Fast Different

Bartlesville, Okla.—Editor Motor Age—I have a Metropol speedster equipped with a 4¼ by 7½ motor. Is this a speed motor?

2—The valves are badly worn and set deeply in the seats. Does this interfere with the speed and the power?

3—Are the Metropol cars being manufactured now?

4—What is the horsepower of this motor?—Alfred Rittersbacher.

1—We do not know what you mean by a speed motor, whether the motor itself is capable of showing a high test in revolutions per minute, or whether it is capable of driving the car at high speed. From the specifications, the opinion is advanced that the motor should be capable of driving the car at a reasonably high rate of speed.

2—Not necessarily, if the valves seat properly and enough lift is given them by the cams.

3—No.

4—The N. A. C. C. rating is 28.9 if a four cylinder, or 43.35 if a six. You do not state which you have.

Bosch System on Marion

Greensburg, Ind.—Editor Motor Age—Please explain Bosch wiring system, by diagram, used in 1912 model Marion.—E. M. Blade.

Splitdorf ignition was used exclusively

on 1912 Marion cars. Very probably a change has been made since your car left the factory and if you can let us know the type of Bosch magneto we will gladly give you the desired information.

WAY TO TIME VALVES ON EMPIRE Chart and Explanation—Wiring Diagram Given for Same Model

Point Pleasant, W. Va.—Editor Motor Age—Kindly publish a diagram showing the timing of a gasoline engine. That is, I want to know the relative positions of the valves and the pistons. The timing has been tampered with on a model 31 Empire roadster, and I desire this information so as to make the motor perform properly. What would be the best way to undertake to adjust this timing arrangement which is operated by means of an endless chain?

2—Also, publish a diagram showing the lighting and starting system used on this model.—Robert L. Hogg.

For a timing diagram of this motor refer to Fig. 6. The camshaft may be set in any desired position within the limits of one tooth, by having the camshaft drive chain brought to a position where the coupling link is exposed through the cover plate on the camshaft sprocket housing and separating the chain at this coupling link. Then with thin sheets of metal, preferably soft tin, slipped under the chain and over the sprocket teeth, it will be found that the camshaft can be moved any desired amount, either forward or backward. One strip of tin only is necessary, this to be used on the top of the sprocket, as the chain on the bottom side will rest against the housing and the teeth of the chain will clear the teeth of the sprocket sufficiently so that it does not have to be held away from contact.

2—The wiring diagram is illustrated in Fig. 5.

EIGHT-VALVE BRISCOE SPEED CARS Motors Manufactured in Chicago by Duesenberg Motor Co.

New Hampton, Ia.—Editor Motor Age—What speed can one get from a Hudson super-six stock car stripped for dirt track work?

2—Were the Duesenberg motors, which were used in the Briscoes driven by Eddie Hearne and Louis Le Cain, sixteen-valve or eight-valve?

3—Where can the Duesenberg motors be purchased?—A. J. Booth.

1—Probably better than 85 miles per hour.

2—Eight-valve.

3—Duesenberg Motor Co., 2259 Oakdale Ave., Chicago.

STORAGE BATTERY FOR LIGHTING Continuous Service of 11 Hours from 6-volt Battery

Harrison, S. Dak.—Editor Motor Age—Is it possible to use a storage battery for lighting purposes only without a generator?

2—How long will a medium-sized battery last?—Fred Vis.

1—Yes.

2—A 6-volt 80-ampere-hour battery will supply a car for 11 hours continuous when two 16-candlepower headlights, two 4-candlepower sidelights, and a 2-candlepower tail light are on.

Stearns Builds Knight Eight

Cincinnati, O.—Editor Motor Age—Does the F. B. Stearns Co., Cleveland, build an eight-cylinder touring car? If so, give the price, bore and stroke of the motor, its r. p. m. for maximum horsepower, and the probable maximum speed of the car.

Inquiries Received and Communications Answered.

Walter Catchings.....Perrin, Tex.
E. Solman.....Toronto, Can.
A. Subscriber.....Goodwin, S. D.
A. Subscriber.....Saumin, S. D.
Alden Beagle.....Buckhannon, W. Va.
Wilson Yearshaw.....Princeton, Ill.
Reader.....Eveleth, Minn.
Peter Viscorich.....San Francisco
Irl Nelson.....Sanford, Fla.
Alfred Rittensbacher.....
.....Bartlesville, Okla.
C. W. M.....Erskine, Minn.
F. F. J.....Storm Lake, Ia.
J. H. Zehrung.....Portland, Ore.
E. M. Blade.....Greensburg, Ind.
Robert L. Hogg.....Point Pleasant, W. Va.
A. J. Booth.....New Hampton, Ia.
Fred Vis.....Harrison, S. D.
Stewart S. Cooper.....Cincinnati, O.

No communications not signed by the inquirer's full name and address will be answered in this department.

2—What is the size and type of motor used in the Owen Magnetic, and the price of this car?—Stewart S. Cooper.

1—Yes. The price of the seven-passenger touring car is \$2,050; bore is 3 1/4 inches, stroke 5 inches. The maximum horsepower is developed at 2,600 r.p.m. The factory rates the maximum speed at 70 miles per hour.

2—L-head, block-cast, six-cylinder motor, bore 3 1/4 inches, stroke 5 1/2 inches.

THE PURPOSE OF A DISTRIBUTOR Function Is to Send Spark to Plug at Proper Moment

Collinsville, Okla.—Editor Motor Age.—Will you please explain what the difference is in a distributing system and a high tension magneto system?

2—Why have so many cars taken off the high tension magneto and replaced it with a distributor?

3—Can you start the motor on a car that has a distributor and coil with the crank when the storage battery is removed or dead, or in other words will a generator make electricity enough with the crank to fire the motor?—A Subscriber.

1—In a distributing system electricity is conducted to the spark plugs from the storage battery through a distributor. The distributor is nothing more than a circuit breaker which sends a spark to each plug at the proper time to fire the cylinder. In a magneto system the current is generated from the magneto, which is a dynamo made to revolve by the operation of the motor. This generated current is fed from the magneto to the plugs at the proper time to fire each cylinder. In other words a distributing system utilizes stored electricity and a magneto utilizes generated electricity.

2—As a matter of simplification. All

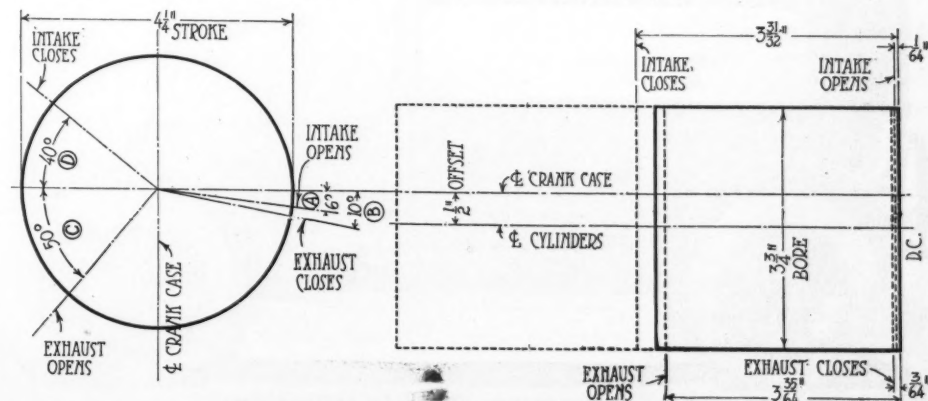


Fig. 6. Timing diagram of model 31 Empire roadster.

modern cars are equipped with storage batteries for starting and lighting and if the current from this battery can also be utilized in igniting the motor, construction is naturally greatly simplified. There are a few cars using three units, that is a starting motor, a generator and a magneto. There are many arguments advanced for and against both systems.

3—No. The generator does not make electricity until it is revolving at a speed which corresponds to a car speed of 10 miles per hour.

TROUBLE WITH HIGH-TEST GAS Water Boils in Radiator with Car Standing Idle and Motor Running

Kingman, Ind.—Editor Motor Age.—I have a model 80-T Overland fitted with a Schebler carburetor, which has run approximately 3,000 miles. This season I have been using a high-test gas with the Stewart vacuum feed and have been having trouble with the water boiling in the radiator. The water will boil in 5 minutes with the engine running at 15 to 18 miles per hour, and car standing still. Have had the carburetor adjusted. The water circulates freely, have scraped the carbon out. The valves have been adjusted and have been ground; crankcase has been cleaned and refilled with 1 1/4 gallon of National oil. Oil circulation is good. What is the cause of the water boiling?

Previous to this season I used a lower grade of gasoline and the water boiled only a few times and then only after a long, slow, hard pull. Is it caused by the high grade of gasoline?

2—How many more miles is claimed for a gallon of high test than that of the standard?—Warren D. Heath.

1—If the conditions are exactly as you state the cause of the water boiling is from the use of the high-test fuel.

2—Assuming complete combustion of both the high-test fuel and the low-test fuel, a greater number of miles will be obtained from a gallon of the low-test fuel than for the high-test fuel.

CANNOT ADJUST AXLE OUTSIDE Worm Gears Can Be Taken Up Only by Shimming

Muskogee, Okla.—Editor Motor Age.—I would like to know if the Weston-Mott rear axle of the 1914 Overland 6-48 is adjustable from the outside, that is, can the driving pinion be brought into proper mesh with the bevel gear without tearing the axle down? If so, give adjustment fully. Give diagram of axle showing all adjustments.

2—What type of bearings are used in the gearset of this car? Are they adjustable.—Clarence H. Dietz.

1—The pinion and ring gear of this axle cannot be adjusted from the outside.

2—The gears can be adjusted by shimming behind them. Shims can be obtained from the factory.

Cantilever Springs and Improved Bodies in Willys-Knight

Pressure-Feed Lubrication to Each Main Bearing—Magneto Replaced by Distributor

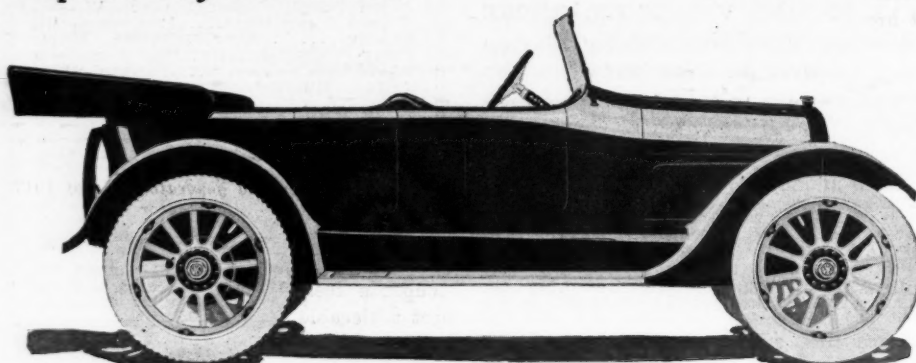
THAT the new Willys-Knight four is the handsomest and most comfortable car ever turned out of the Willys-Overland factory in Toledo, Ohio, is beyond all question. It is a seven-passenger car with all the most modern lines and fittings; it has an improved system of cantilever spring suspension, it has a completely new rear axle and a new gearset in combination with the axle. Naturally, with all these improvements the price has been increased a trifle, being now \$1,285 for the touring car, in addition to which there are two closed types at \$1,950. Of these, one is a seven-passenger touring sedan of the Springfield pattern, with a permanent top and glass windows which remove completely, and the other is a seven-passenger limousine.

Great Care in Finishing

On all three models great care is taken with the finish which is to be maintained at a quality in keeping with the fine lines of the bodies. It is becoming almost platitudinous to describe a 1917 car as having a custom built aspect, but this is really the best way to sum up the external points of the new Willys-Knight.

As to the chassis, the wheelbase is now 121 inches but the changes in detail, considerable though they are, do not appear at a glance. The engine, 4½ by 4½ and is the same as the 1916 series except for the ignition which is now the Connecticut battery system instead of magneto.

The electrical equipment is now all Auto-Lite except the actual distributor; the generator which is very little larger than the magneto, is mounted on the right side of the engine and chain-driven direct from the crankshaft. With it the ignition unit is combined and the coil is mounted in a clip on top of the chain case, this making the wiring of minimum length. To drive the generator the chain pinion has an internally toothed ring outside the case, and the generator shaft a pinion with a cor-



The 1917 Willys-Knight touring body is of the double-cowl type

responding number of teeth which fits inside the ring. This gives the small amount of universal action required to allow for minute differences in alignment and also allows the generator a single screw holding the clip which retains the generator on its platform.

The starting motor has a Bendix pinion which draws forward, towards the body of the motor, to engage, so that there is a minimum of overhang when the starter is operating. The motor lies just beneath the right rear supporting arm of the engine where it does not interfere with the accessibility of any other part. Completing the electrical system, the battery is housed beneath the floor in the driver's compartment, on the right side, and is accessible through a detachable panel in the guard strip which joins the running board to the frame.

System of Lubrication

One of the interesting features of the engine is the system of lubrication. The earlier Knight engines were all splash lubricated, but the Willys-Knight has a pressure feed to each main bearing on the crankshaft, whence drilled holes carry the oil to the connecting-rod ends. Thence the overflow is whirled out by the cranks, so reaching the sleeves which are grooved to conduct an adequate supply to every part

of the working surfaces. The oil pump is a plunger pattern, located in the base of the crankcase, and the supply delivered to the bearings is controlled by a throttle working in conjunction with the carburetor throttle, so that the engine receives oil in proportion to the work demanded at the moment. One noticeable result of this control is that the Willys-Knight engine is not prone to smoke.

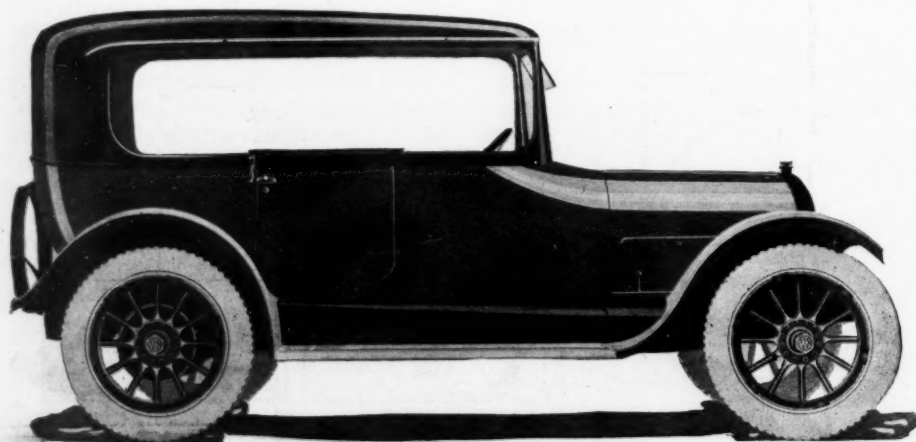
Experience with the 12,000 cars made in the past year shows that this engine has the quality common to all Knight motors of insusceptibility to carbon. Firstly, carbon does not form so fast as in an L head engine and, secondly, when it does form it has much less effect on the running. Up to a point carbon is actually beneficial to a Knight engine, putting a sheen on the sleeves and port edges. The exact reason why this should be so has not yet been stated, but probably the absence of trouble due to presence of carbon is because of the almost spherical shape of the combustion space, and the absence of any roughness. In a Knight engine every part of the combustion chamber is machined, and there are no angles or pockets to house deposits which could get red hot and cause pre-ignition.

Thermo-Syphon Cooling

Thermo-syphon cooling, which has been used in the 1916 series is retained for the new model. There is a passage through the crankcase which makes the inlet to the cylinders from the radiator, as seen in the illustration of the right side of the motor. From the top of the cylinders a large aluminum header returns the hot water to the radiator, the water path being almost ideal for straightness and freedom from twists.

As before, carburetion is cared for by a Tillotson instrument of horizontal form bolting directly to the cylinders and drawing hot air from a muff on the exhaust pipe. The gasoline tank is at the rear end of the chassis and the fuel supply is maintained by a Stewart vacuum feed.

The transmission system follows the



Touring sedan body on 1917 Willys-Knight chassis

same general lines; that is to say, the gear-set is in a unit with the back axle and a stout torque tube incloses the propeller shaft. This torque tube is hung on pivots at the front end, thus taking both the driving effort and the torque reactive stresses. Though, at first glance, the gear-set appears much the same as previously, it is actually a complete new design, having the countershaft beneath the mainshaft instead of beside it. This change makes the box narrower and so stiffer. Three speeds are used and the arrangement of the bearings is rather out of the ordinary. Of course, the tail-end bearing on the mainshaft takes the bevel pinion thrust, so a large double row New Departure ball bearing is used. At the front end of the mainshaft is a substantial single row ball race and the spigot bearing is a Hyatt roller. The countershaft is fixed in the case, the whole set of countershaft gears being assembled into a unit which is bored out larger than the fixed shaft, the space between being filled completely with Hyatt rollers from end to end.

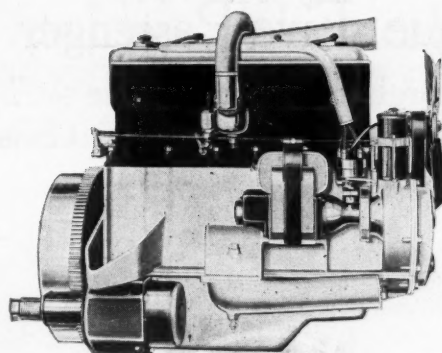
Change in Rear Axle Design

Another notable change is in the rear axle construction. Formerly the axle had a cast-center case with tubes bolted to it, but now there is a steel stamping of the so-called banjo form, the differential being carried on brackets projecting from the back of the gearbox. At the back of the axle a simple cover plate completes the inclosure of the differential so that inspection is possible with the removal of only a few nuts. The road wheels are mounted outside tubular sleeves which are fixed in the ends of the banjo stamping, so the new axle is full-floating. Throughout the bearings used are Timken taper-roller adjustable.

For brakes there is the conventional layout of external and internal on the same drums, but attention should be given to the very substantial shoes used for the internal portion, giving a rigidity to the working surfaces which results in a very smooth though powerful action.

Still another transmission change is in the universal joint which is now made up of six leather disks in two sets of three disks. This gives perfect universality without any metallic moving parts, there are no surfaces to wear and nothing that can ever make a noise. The life of the leather is said to be entirely satisfactory and it is worth noting that real leather is used, not a composition. Actually it is much the same sort of leather as is commonly employed for facing cone clutches. The flexibility of this universal is quite remarkable; it feels, when moved by hand, as free as any metal joint and more free than some of them.

The cantilever rear springs are 48 inches long and 2½ inches wide, and applying the test of driving across a railroad at 20 miles per hour proved their ability to absorb shock. At this speed the rear-seat passengers can just feel the crossing, but are



Carburetor, starter and generator side of 1917 Willys-Knight motor

not shaken off the seat, and the front seat occupants feel nothing. In handling the most noticeable feature is the ease of gear shifting, due to the soft-acting cone clutch and the strong clutch brake which quickly brings the cone to rest. Still, with a high gear ratio of 4.6 to 1 which is the standard, there is little need for the shift lever, as the engine operates smoothly down to 5 miles per hour and even below this speed. Another point which is noticed when driving the car for the first time is that there is no apparent increase in vibration at high speed. At 20 miles per hour there is a slight tremor which can be felt in the front seat but not in the rear one. At 40 miles per hour this tremor is, if anything, less noticeable, while the engine is, of course, just as quiet at 50 as at 20. The pulling at slow speed is markedly good, and the acceleration smooth and easy.

Coming back again to the bodywork, this is much more rugged in construction and great pains have been taken to strengthen all points where weakness might lead to squeak or rattle. The upholstery is deep and very soft, both the cushions and the back padding being the kind that the body sinks into. Whichever way one leans there is a springy give conforming to the attitude taken. For the cowl-board and for the back of the front seat into which the folding seats disappear a grained finish is employed, so cunningly devised that the closest examination does not disclose the fact that the material is made of steel as it is thoroughly in keeping with the leather of the upholstery, in fact, every detail is in keeping with the rest.

A small change which has not been men-

tioned, is in the radiator shell. While still distinctively Willys, this now has a bulge at the front of the top tank, slightly overhanging the core and helping to round out the lines of the front end. All the usual accessories are neatly arranged in the cowl-board, the magnetic speedometer, electrical gages and oil pressure gage, while a little glove cupboard occupies a part of the board not needed for anything else. Included in the equipment are a Moto-Meter and a gasoline gauge. All the finish is in a dark rich blue, upholstery, body and hood all matching. The road wheels are grey, and black is used for the fenders; fittings are of nickel or polished aluminum. For tires, the size is 34 by 4½ inches, the touring car having plain treads on the front wheels with non-skid on the rear, while the closed cars have non-skid all around.

GROWTH BY LANSING BUILDERS

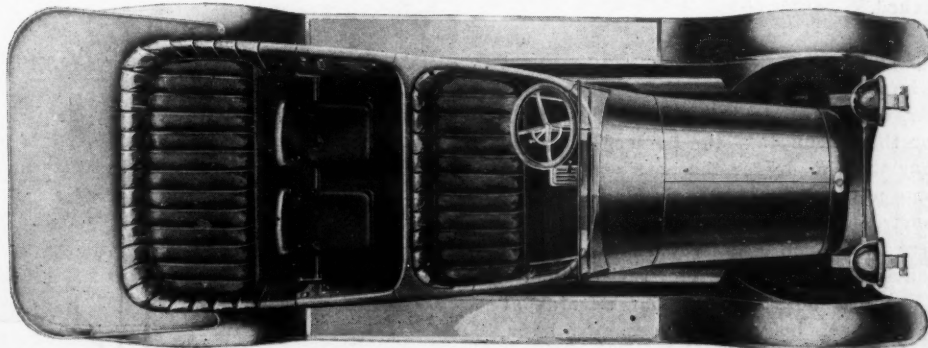
Lansing, Mich., Aug. 6—The biggest month of July since motor cars have been made in this city, is what the officials of nearly ever motor car and parts manufacturing plant in the capital of Michigan had to say when asked how the present month compares with former years.

"Just look at the payroll and you have the answer," said several production and sales managers. Looking at the conditions at the Reo Motor Car Co., it was seen that there are now 3,645 men on the payroll, or 993 more than in July 1915. At the Reo Motor Truck Co., which moved into its new plant several months ago, but in which many departments are still lacking all of the needed equipment, there are 352 men working instead of 318 as last year. Were conditions normal in the plant, could all departments be operated as per intended schedule, then there would be at least 600 men on the payroll now.

At the Olds Motor Works, the Auto Wheels Co., W. K. Prudden & Co., Bates & Edmonds and many others, there are from 50 to 250 more men now employed.

COMMON SENSE DRAWBAR

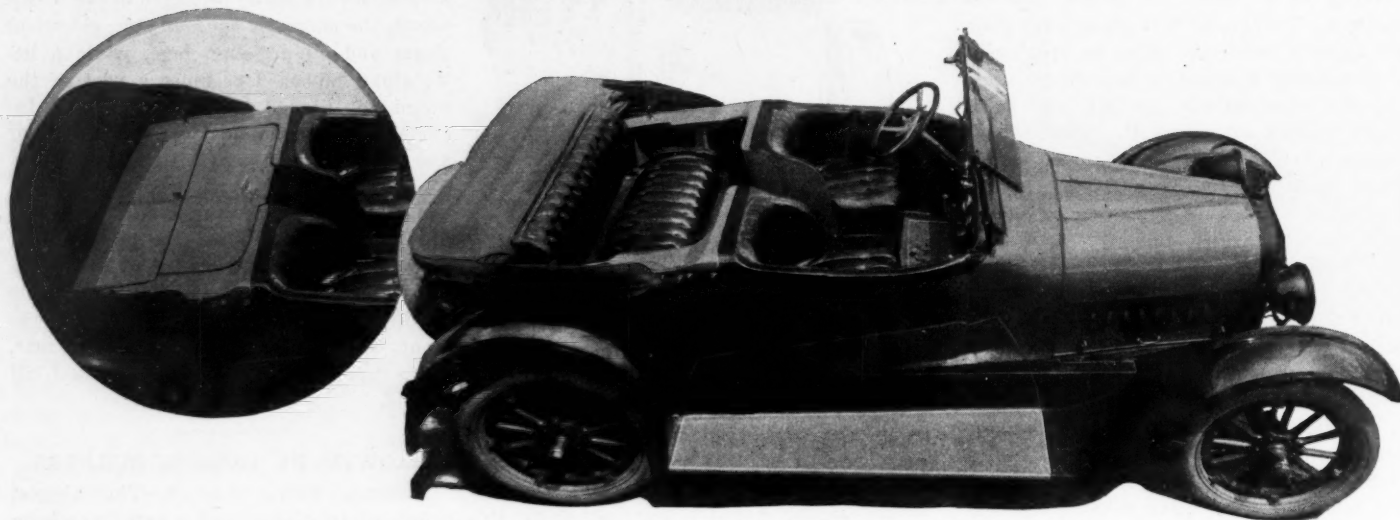
In the August 3 issue of Motor Age, page 52, the eight-cylinder Common Sense gas tractor was stated to have a drawbar pull of 1,100 pounds. This was an error inasmuch as the drawbar pull, according to the factory rating, is 4,100 pounds.



Looking down on Willys-Knight seven-passenger car—a 1917 model

Anderson Has Unique Five-Passenger Roadster for 1917

Mercer Offers Straight-line Limousine — Two New Enclosed Bodies on Overland 85 Chassis



Views of 1917 Anderson five-passenger roadster, showing body closed and open

The Anderson 6-40, made by the Anderson Motor Car Co., Rock Hill, S. C., will be continued without mechanical change for the 1917 selling season. A combination roadster is the only addition to the line, and this is probably the most novel construction of any car that has been offered this season.

The new job is a five-passenger roadster. The rear seat can be folded up and covered by a very simple operation converting the car into a two-passenger roadster. It is really a roadster and touring car combined with all the advantages of both. When the rear seat is closed the space between the individual front seats, which allows entrance to the rear compartment, is also closed by an upholstered panel which folds from the floor. The opposite side of the panel is covered with carpet and serves as a part of the floor when the rear compartment is opened.

Besides the roadster model this company, which is the only Southern motor car manufacturer, offers a five-passenger touring car, six-passenger touring car, seven-passenger touring car and a regular two-passenger roadster all of which are mounted on the same chassis and which are continued without change from the 1916 models. The price of \$1,250 is continued.

REO SIX REDUCED \$100

Lansing, Mich., Aug. 5—The Reo Motor Car Co. announces that it will continue for the season 1917 the passenger cars as they were made for the past season, with some minor improvements. Mechanical or constructional changes of any importance were not found necessary as the present models are giving splendid satisfaction.

The price of the Reo four remains at \$875. A new body style, an enclosed body, has been added. It will be listed at \$1,025.

A reduction of \$100 has been made in the price of the Reo six, which now sells at \$1,150 instead of \$1,250 the past season. Here also a new body style, a sedan, has been added and it will sell at \$1,750.

The Reo Motor Truck Co. will continue to make its 1,500-pound and 2-ton models. While the price of the bigger truck remains unchanged at \$1,650, a reduction of \$75 has been made on the price of the smaller truck which now sells for \$1,000.

HOLLIER SIX FOR 1917

Detroit, Mich., Aug. 8—The Lewis Spring & Axle Co., Chelsea, Mich., which is making the Hollier eight, has added a six to its 1917 line which will sell at \$1,085 with either a five-passenger touring body or a four-passenger roadster. A valve-in-the-head motor is used, block cast, which has a 3-inch bore and 4¼-inch stroke. The wheelbase is 116 inches, and the artillery wheels are fitted with non-skid tires all around, size 33 by 4. The gearset is of the selective type, three speeds forward and one reverse and the clutch is leather

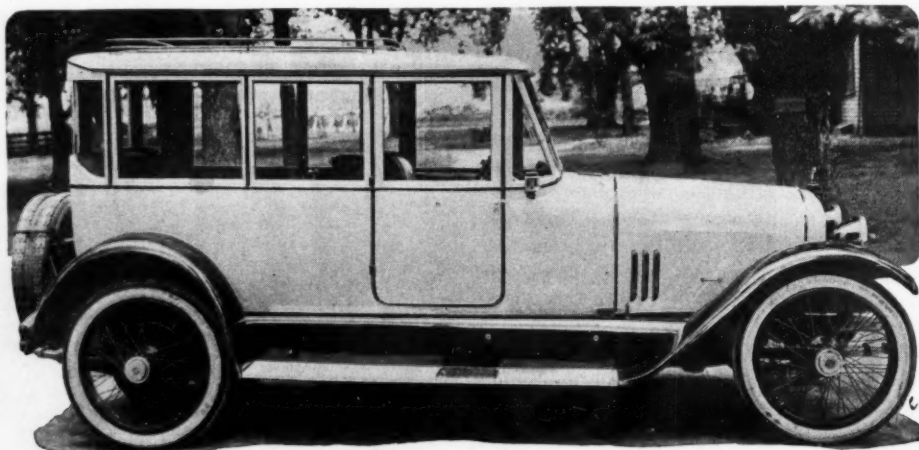
faced on an aluminum cone casting. The drive is left hand and the control center. Front springs are semi-elliptic and rear cantilever. The rear axle is floating.

STUTZ BULLDOG ROADSTER

In the description of the Stutz series R in Motor Age issue of August 3, the four-passenger Bulldog roadster, through a typographical error was captioned a five-passenger roadster. The six-passenger special is of the same body design, except that it is equipped with two auxiliary seats which fold into the rear of the front seats. The Stutz company does not consider its models by years, but by series.

A NEW CHASE MODEL

Syracuse, N. Y., Aug. 5—The Chase Motor Truck Co. will shortly announce a new Chase model to be known as model X, a 3-ton worm-drive job to retail at \$2,800, equipped with cab. This new model will round out a line of Chase worm-drive trucks of three-fourths-ton, 1-ton, 1½-ton, 3-ton and 3½-ton carrying capacities.



New limousine body on Mercer 22-72 chassis

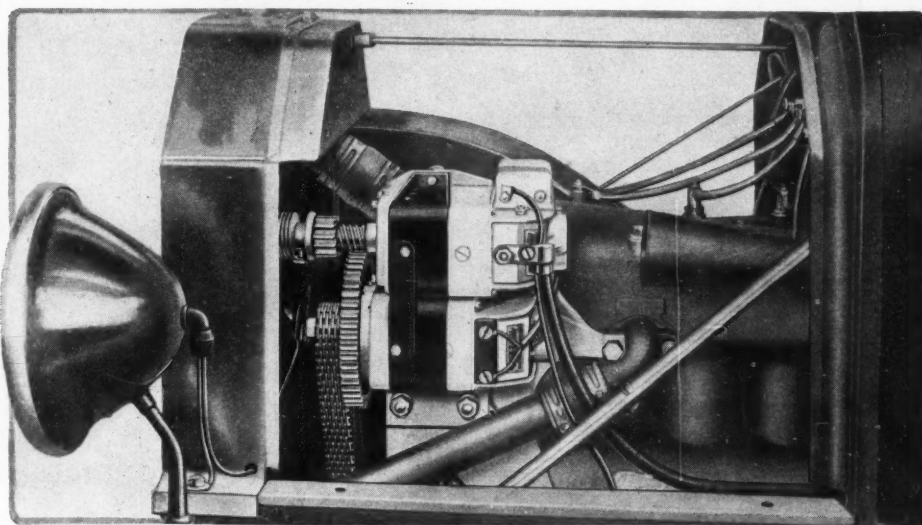
Gray & Davis Two-Unit Electrical System for Fords

Steady Lighting and Powerful Starting Claimed as Features of \$75 Equipment

GRAY & DAVIS announce the production of a new starting-lighting system for the Ford, embodying the same characteristics found in Gray & Davis systems as installed on high-priced cars. Notwithstanding the increased cost of material and labor, this device sells for \$75, f. o. b. Boston and will be merchandised through the company's distributors as was the custom in placing the previous Ford system on the market. The new system is of double-unit design. It is easily installed on any model T Ford.

This system, although sturdy, is light in weight, simplified in every detail, and designed to avoid mechanical strains. It supplies a uniform, brilliant light and has abundant power to crank the engine readily.

There is one-unit dynamo for generating current, and one unit starting motor for starting the engine. While driving an even flow of current from the dynamo charges the battery. The system consists of dynamo, with regular cutout; starting motor, battery and battery box, lighting and starting switches, sprockets, chain, wiring, in fact, all necessary items. The dynamo is driven from the sprocket on the

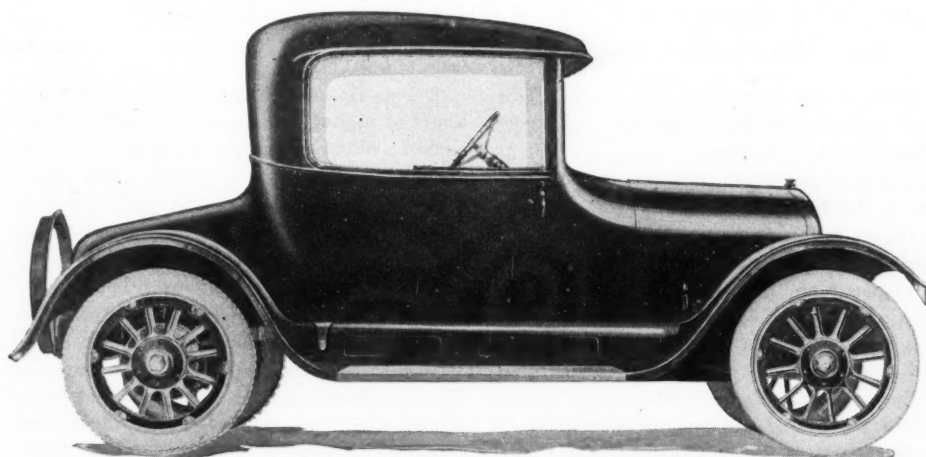


New two-unit Gray & Davis starting and lighting system for Fords

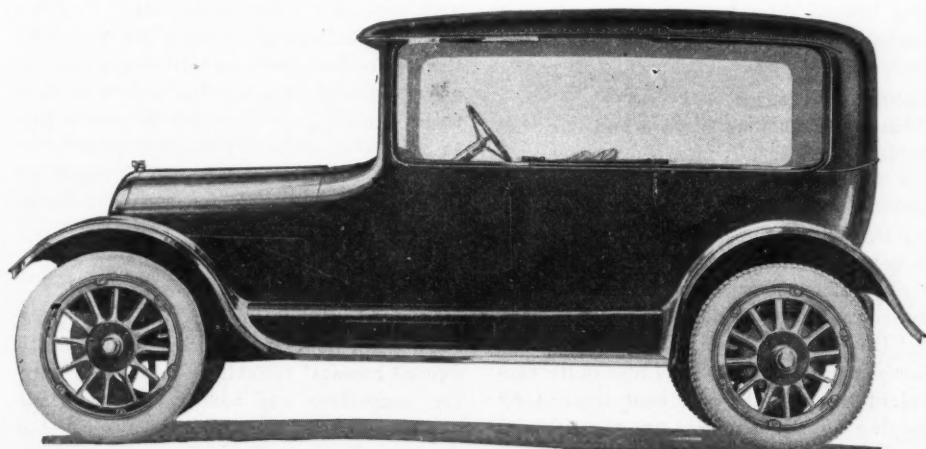
crankshaft by a silent chain of liberal width. The regulator cut-out automatically performs two duties. It regulates the dynamo output so as to deliver a steady current, and cuts out or keeps the dynamo circuit open at low car speed to prevent discharge of the current.

Located above the dynamo is the starting motor. It has the Bendix drive which, when the starting pedal is pressed, the motor turns, the pinion or small gear automatically moves along the motor shaft until fully wedged with the dynamo gear when the motor cranks the engine. As the engine starts, the dynamo gear is turned faster and automatically spins the starting pinion along the threaded shaft out of engagement.

Both units are substantially constructed; the frames are forged from special dynamo steel. The end, or rear brackets, are electrically welded to the frame. The battery is carried in an enameled steel box and supplies current for cranking the engine, and for lamps at low car speed as well as when engine is at rest. The battery is automatically recharged by the dynamo when the car is running. The lighting switch, conveniently located to the left of the cowl in front of the driver, controls the head, side and rear lamps. The starting switch is placed under the heel board, with the pedal projecting through. All wires and cables are cut to proper length and supplied with supporting clips and terminals to facilitate a neat installation. The only part removed from the engine to make installation is the pulley on crankshaft.



Overland model 85 touring coupe—a 1917 product

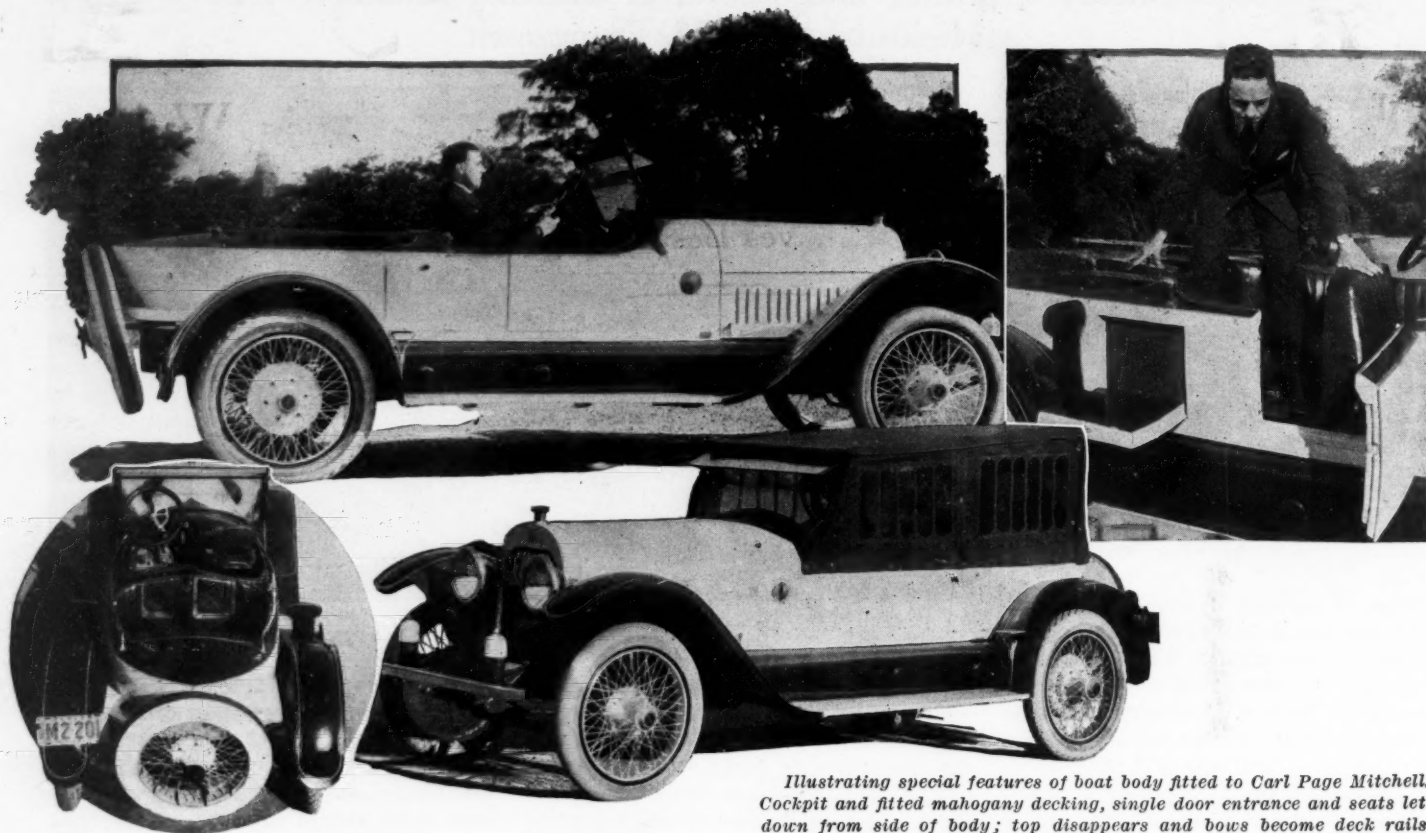


Overland 1917 model 85 touring sedan

86,690 CARS IN NEBRASKA

Omaha, Neb., August 9—The most surprising strides in motor car registration in the history of Nebraska have been registered within the past two months, when nearly 10,000 cars have been added to the roster of those owned within the state, exclusive of those not yet registered. It is predicted that there will be 90,000 cars registered this year.

Launch Design Creates Individuality in Sport Body



Illustrating special features of boat body fitted to Carl Page Mitchell. Cockpit and fitted mahogany decking, single door entrance and seats let down from side of body; top disappears and bows become deck rails

New York Dealer Carries Out Aquatic Idea in Special Superstructure for Mitchell Chassis

A BOAT body of unusual ingenuity has been designed by J. A. Clark of the Carl H. Page Co., New York Mitchell dealers. The car was designed for the personal use of Mr. Page and is not a mere ornament, but intended to be of utility. In spite of the radical design, the car will seat six full-grown passengers and a child.

As shown by the illustrations, the car has followed boat lines to a remarkable degree, being fitted with mahogany decking and a cockpit which is the exact counterpart of those used on many small pleasure craft. The lines follow those used in launch work, coming together at the stern with a pronounced aquatic suggestion. The finish is in white enamel for the body with the upholstery and running gear of the same shade of green. The wheels are wire, and the chassis is the stock Mitchell.

Ordinarily the car is adaptable for four adult passengers, the rear and front seats holding two apiece. In addition there are two seats which let down from the sides of the body, being concealed by a door in the side when they are not in use. These seats are supported by the rubber-covered step on the sides of the car and are large enough for comfortable riding for any reasonable distance. In addition to these two extra seats, there is a child's seat which fits in the forward compartment just

in front of the seat beside the driver. This seat can also be folded up and put away when it is not needed.

Probably the most ingenious part of the car is the arrangement of the top. This is invisible when it is not in use, and the bows which support it are folded down and are exactly similar to the deck rails on the side of a boat. When the top is needed, the deck rails are unclamped and are folded upward, forming the top stanchions from a compartment in the rear, the remaining parts of the top are taken and in a short time the open boat becomes a submarine type, with the top forming the conning tower. The top can be used as a sunshade without the side curtains if desired.

Ingenious Features

Another ingenious feature and one that could be used to advantage on many ordinary types of bodies is in the single-door entrance. This is located on the right side and leads into the driver's compartment. To get from the front to the rear of the car, there is a door which forms the back of the front seat. This can be swung back by tilting up the cushion on the seat and allows easy entrance. It is also quite convenient to enter the rear compartment by stepping on the supports for the fold-out side seats, which form excellent steps and are, besides, rubber covered.

Drive is carried through a propeller shaft of nickel steel tubing, having a 2-inch outside diameter and a wall thickness of $\frac{1}{4}$ -inch. The use of a Hollow drive shaft is accepted and is the best type of modern shaft design, in that it is stronger and lighter than a solid shaft of similar size, and also prevents whipping. There is a universal joint mounted at either end, immediately back of the rear one the shaft entering the rear axle unit, which is a Timken floating construction, fitted with spiral bevel driving gears and all carried on Timken roller bearings. The axle housing is a steel pressing with axle tubes in unit with the differential case. A large plate at the rear gives complete access to the differential gears and driving gears for adjustment or repair. The axle affords a ratio of 45/11 to 1, which is plenty low to give the motor all the opportunity it needs to handle the car credibly both as regards acceleration, slow-speed running, and flexibility.

ST. LOUIS CLUB PLANS RUN

St. Louis, Mo., Aug. 5—The Automobile Club of St. Louis is preparing for the ninth annual owners' reliability tour. The touring committee has named Samuel Plant chairman of a committee to inspect the roads to Keokuk, Ia., with a view of selecting a route to that point for the event.

The Motor Car Repair Shop

Observance of Expansion and Contraction Law in Welding Preheating of Entire Piece Upon Which Weld is to Be Made, Gives Best Results

THE present-day garage which is not fitted with an up-to-date welding apparatus is losing a lot of profitable business. The garage which has a welding apparatus with no mechanic who could be called proficient in operating it, is also losing business and money. A batch of poor jobs palmed off on the public wins a name for inexperience which soon makes the welding apparatus a white elephant.

Any good mechanic can make a weld that will hold. Very few know how to make the necessary provision to overcome shrinkage by the cooling of the weld. There is nothing that can prevent the contracting or shrinking of cooling metals and there seems to be nothing more difficult than to impress that fact on the average operator of any oxy-acetylene welding equipment.

Welding by Metal Fusion

Welding by the use of a combination oxygen and acetylene flame is a process of fusion of metals. It is not comparable to soldering or brazing. The metal to be joined is melted. The process can be considered the same as recasting. Pattern-makers allow for shrinkage when they shape patterns for castings, and the same thing is as necessary in fusion welding. It is useless to put shafts into the crankcase bearings or bolt angle iron to the sides to prevent contraction.

Heated steel must expand and if the crank is locked into the case, there is great danger of breaking the aluminum or cast-iron housing. If a crankcase is broken in many pieces it is sometimes advisable to use angle irons and shafts in order to secure the alignment. These should be taken off before welding, however, as their use is really detrimental. They will not prevent contraction.

Contraction may be prevented in several ways. One is in limiting the heated area by the use of wet cloths or asbestos or in the case of sheet-metal welding, by spreading the opening a certain percentage of the length of the weld.

A better way, and one which may be applied to practically every case of motor car welding, is to offset the contraction of the welded area by preheating another section, or in some cases by slowly heating the whole article. In some instances, preheating is not necessary, in others it is es-

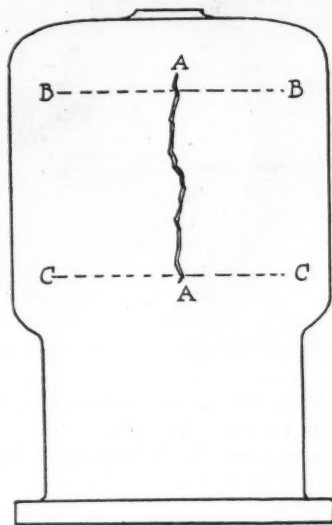


Fig. 1—Cylinder block in which crack AA is to be welded

sential. Three things must be taken into consideration in judging whether a part must be preheated to overcome the effects of contraction, first, whether there is an opportunity for the contraction and expansion to take place naturally; second, the conductivity of the metal welded, and third, the ductility of the metal.

Take a crankshaft as an example in the first instance. Referring to Fig. 2 the weld is made at A. The distance from B to C, of course, will increase as the metal becomes hot and decrease as it becomes cold. The end C being free, there is nothing to prevent its moving and it does so. No preheating is necessary in this instance to offset contraction. Further illustrations of welds of this character are chassis or lug welds, truss or torsion rods or tubes, or an arm on aluminum casting.

Fig. 1 shows a break in the water jacket of a cylinder. If the break at AA is welded in the same manner as the shaft described above, there must be some provision to take care of the contraction. The jacket is a solid piece and is firmly joined

to the cylinder in many places. Furthermore, cast iron is not ductile; that is, it will not bend readily. The welded section in cooling must occupy a smaller space than the molten metal. It being impossible for the melted metal to shrink along the general lines BB and CC, and cast iron being brittle, the weld, which is the weakest section, breaks. If the jacket were steel, which is a very ductile metal, it would be possible to make the weld without contraction breaking it, for the reason that other portions of the jacket would twist or warp, thus taking care of the contraction.

But, if the cylinder is heated over its entire surface to a dull red heat, all portions of it are expanded. Then, if the weld is quickly made the cylinder, being practically the same heat everywhere on its surface, cools and contracts equally throughout its surface.

Aluminum Welding

Practically the same conditions hold true in an aluminum casting, but in this instance breaks are not always the case, as this metal will often twist and warp out of shape before splitting. Aluminum is a very good conductor of heat. Therefore the expansion set up by the welding flame is considerable and the shrinkage in cooling is correspondingly more than in other metals used in motor car construction. As previously stated, cast iron will usually break in cooling unless allowance is made for the contraction by preheating. Aluminum, on the other hand, may bend other sections in cooling, due to its ductility, and this is the reason why a crankcase will sometimes be found to be shorter on the welded side.

Take another example. A rear-axle housing half is brazed and when assembled it leaks grease badly. Because the part did not break in cooling, the weld being firm, the job is considered successful. Malleable iron is ductile and for this reason will not break readily. However, if the housing had been preheated properly the machined surfaces would have fitted together as they did before the break occurred.

Of course, every repair job is different. Each has to be studied for its particular peculiarities. Nevertheless, if the law is properly recognized, the operator will soon become expert.

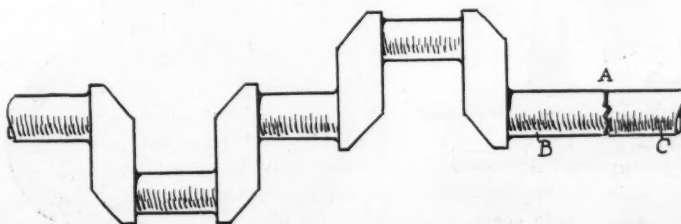
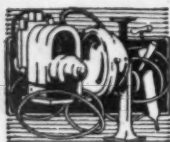


Fig. 2—Break in crankshaft at A may be welded without preheating



The Accessory Corner



Quick-change Connecting Rod

JOSEPH T. RYERSON & SON, Chicago, have just introduced a quick-change bearing and connecting rod for Ford motors. The advantages claimed are: ability to replace a bearing without installing a new connecting rod, extra bearings, inexpensive, light and easily carried, time saved by being obliged to replace bearing only, unusual strength through the reinforcement of the bearing. In other words, a new bearing can be slipped in without tearing down the whole motor and these bearings are substantial and handy to use. The bearing itself is the Glyco skeleton construction, consisting of a strong skeleton or reinforcement introduced into genuine babbit. Special laminated shims come with each set of bearings, which are inserted, one on either side, where the two halves of the connecting rod meet. They are composed of metal leaves, .002 of an inch thick, and can be peeled off when the bearing wears to give the proper adjustment. The connecting rod unit is made up of two forgings held together by cap screws and castellated nuts.

Accessible Simplex Magneto

A new high-tension magneto has been put out by the Simplex Magneto Co., Inc., New York City. One of the features of the magneto, which is a high-tension type, and which in general is designed along conventional lines, is the simple interrupter, which is so constructed that the centrifugal force of its moving parts is absorbed, thus maintaining an equality of pressure between the contact points and giving the same working conditions at high or low speeds. Another feature of the instrument is the ready accessibility of its vital parts and the ease of disassembling to make minor repairs. An additional point of originality is the cast-in pole piece which is a laminated structure but so arranged that it does not have to be pierced by pins or bolts which would tend to increase the magnetic reluctance. The



Sebring tire with tread of pure gum

pole pieces and housing being integral, the air gap between the armature and field poles is very small. This tends to increase the intensity of the spark at low speeds, and furthermore, since the poles and housing are integral, they can be bored together to insure their alignment, and also renders the construction inherently waterproof. In general the Simplex magneto is a high-tension type carrying both the low tension and high-tension winding upon the single armature. The core is of laminated iron and on each side of this is a pole piece of the same quality of iron as is used in the armature. Holding this whole construction together are two bars which are firmly riveted into the pole pieces.

Alloy Pistons for Cars or Boats

The Green Engineering Co., Dayton, Ohio, is marketing an alloy piston known as aluminite, which is of the hour-glass design. The latest improvement in the design of this product is the addition of a wiper ring below the piston pin as an added precaution in keeping the oil from passing up onto the piston head. The manufacturers have a novel plan of selling their product in that they request car owners to forward their entire motors

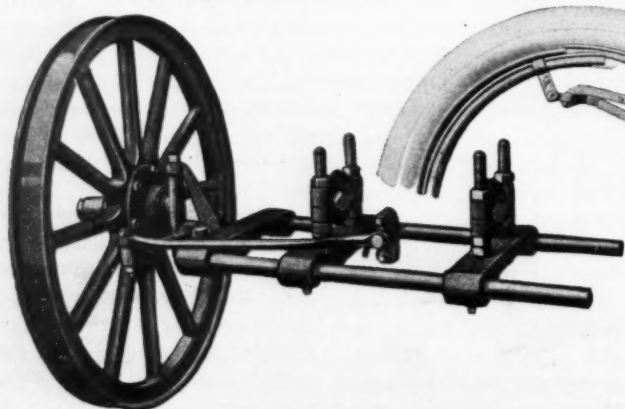
direct to the factory, there to put the entire powerplant into good condition. The cylinders are ground, aluminite pistons fitted and the compression equalized and tested. Passages are cleaned out, burrs are removed from the ports, flywheels and crankshafts are accurately balanced. Quotations are based upon the work needed and the cost of the pistons and rings.

Crutch for Disabled Cars

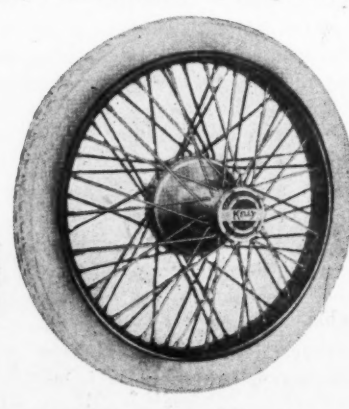
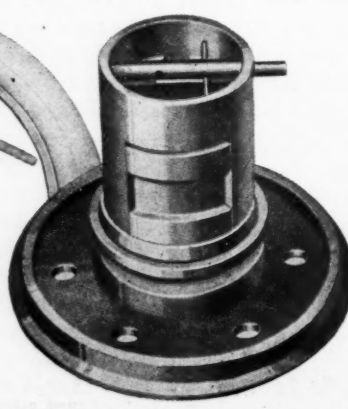
A device which can be used as a front or rear wheel conveyor for disabled cars is a product of the Gearless Differential Co., Detroit, Mich., and it is known as the Compo crutch. To attach the device it is only necessary to remove four clamp nuts, attach the tie-rod to the steering cross or tie-rod of the motor car; then tighten the four clamp nuts. As will be seen from the illustration, the crutch consists of two main supporting bars connected to a yoke which may be locked when used with the rear wheel or adjusted for steering when used with the front. The axle is clamped to two supporting members between the supporting bars. By removing one bolt, the wheel may be detached from the frame, making a compact load which one man can carry, it weighing but 63 pounds. The price complete with a wheel for 3½-inch tire, tire and tube not included, is \$30.

Truck Converter for Fords

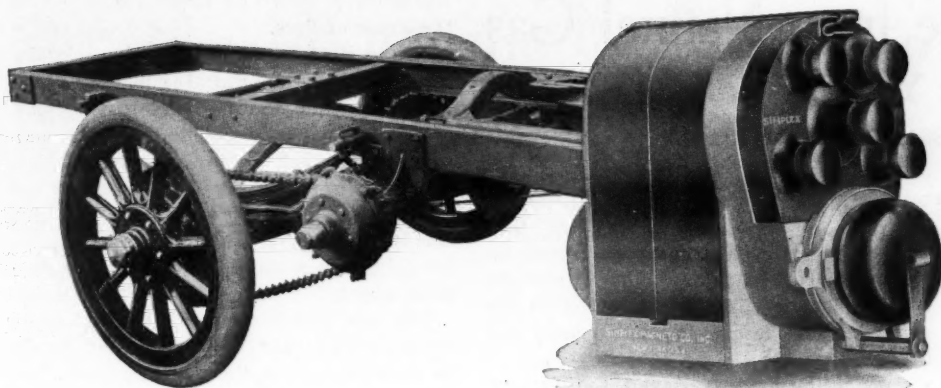
Something rather unusual along the line of truck attachments for Ford cars is being manufactured by the Franklin Converter Co., Herald Bldg., Chicago. The Ford axle becomes a jackshaft and is bolted onto the new channel frame by means of a special casting. It would appear that the axle would require shortening to retain the standard wheelbase of 56 inches, but this is done away with by employing a special bell-sprocket that telescopes the Ford brake-drum. To set up the converter, as it is called, the rear wheel, rear spring and radius rods of the Ford are removed and the new equipment bolted on. An advantage is that the car can readily be converted from pleasure



Left—Crutch for disabled cars. Right—Universal rim tool



Construction of hub and assembly of Kelley wire wheel



Quickly-attached truck for Fords

Simplex magneto, high-tension type

car to truck with the aid of a wrench. With the converter attached the wheel base is 127 inches and the truck capacity is rated at 2,000 to 3,000 pounds. Drive is by two chains. The price is \$345.

Tool for Transversely-Split Rims

The K. P. rim tool, manufactured by the K. P. Mfg. Co., 250 W. 54th St., New York City, used on such rims as the Baker, Stawell, Kelsey, Detroit and others of the transversely-split type, makes a great saving in the time and labor consumed in changing casings. The device locks the rim in a collapsed position while the tire is being removed or replaced, on the Baker rim pulls the joint down and sideways so as to clear the valve system, opens the joint on such rims as use an interlock, and forces the rim back and in alignment for locking. The device is simplicity itself, there being but four parts; two jars, a connecting rod and a handle for operating. The construction can be readily understood by viewing the illustration. The price is \$2.

Efficiency Tire

The Sebring Tire and Rubber Co., Sebring, Ohio, after having conducted exhaustive tests on the road with a tire constructed of pure gum rubber, is now ready to market the new product direct from the factory. The fabric is seven-ply, impregnated with pure gum. Between the fabric and casing is a pure-gum, friction skim coat and on top of this is the road-contact tread which is shaped in a non-skid tread of original pattern. The non-skid type only will be manufactured. Straight side tires are offered, but applicable to any type of rim. The Ford size is the only exception and this is of course a regular clincher. Cables of piano wire, nineteen strands in each cable and the number of cables varying with the size of the tire, serve to retain the tire on the rim under any strain. This construction, together with the use of gum rubber is said to practically eliminate rim cutting.

Quick Detachable Wire Wheels

The mechanical principle governing the construction of the Kelley quick-detachable wire wheel, being manufactured by the Craftsman Motor Corp., Chicago, seems to be a marked departure from driving and retaining devices heretofore utilized in

this equipment. The makers claim for their new product positive safety against wheel throwing coupled with unusual speed and simplicity in assembling and dismounting. The Kelley hub consists of the hub shell, from which the spokes are laced; the inner hub, which is broached and machined to adapt the wheel to any make of car; and the driving sleeve. On the inner wall of the hub shell, integral with the hub itself, are two blocks or lugs. On the outer wall of the inner hub are four blocks or lugs. To mount the Kelley wheel simply means slipping the hub shell of the wheel over the inner hub, allowing the two blocks on the side wall of the hub to slide through the grooves formed by the ends of the blocks on the outer surfaces of the inner hub; then by pushing the U-shaped sleeve into the end of the hub, at the same time rotating the wheel a quarter of a turn to the right or left, the entire hub automatically assembles itself in place. With the hub completely in place the flow of power is through the axle spindle into the inner hub and the ends of the lugs on the inner hub pushing against the blocks on the inside wall of the hub shell, a perfect pocket having been formed to receive these blocks by means of the sleeve and the lugs on the inner hub. The same lugs that drive the wheel also retain it in place. As an added safeguard against the sleeve working out of the hub, should a hub cap be lost, a plunger is fitted into the sleeve, this plunger resting back on the flange in the end of the hub. The

hub cap is merely a dust guard, having nothing to do with retaining the wheel.

Gasoline and Oil Handling System.

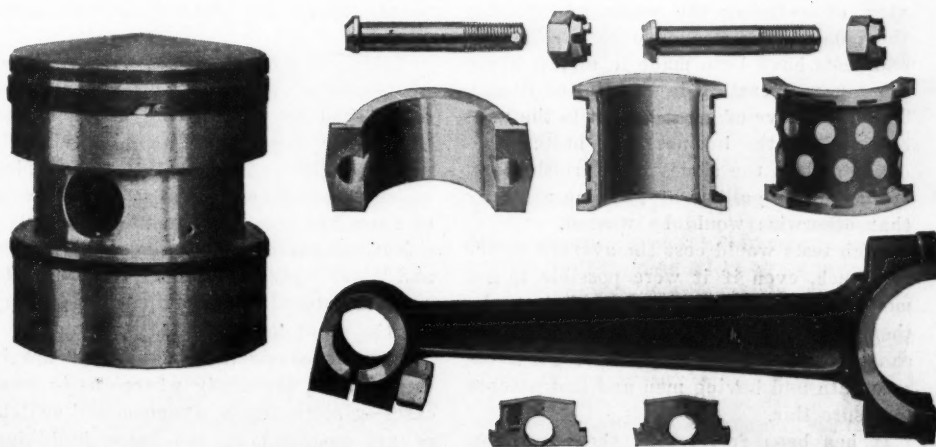
Instantaneous flow of the liquids at any point of use by means of air pressure, without pumps or other devices, characterizes the gasoline and oil storage and distributing system developed by the Allen Pressure Company, 1926 Broadway, New York. With the pump system, the elevation that the liquid may be raised is about thirty-two feet, but the Allen Pressure System permits the flow at any elevation, requires no labor and eliminates all working parts. The system consists of the usual underground storage tank, with the addition of as many secondary or "Working Tanks" as there are draw-offs in the system. Each working tank is connected with the storage tank by a supply line through an automatic check valve.

Portable Floor Crane.

A portable, hand-operated floor crane, having the high lift and deep overhang required in repairshop work, is manufactured by the United States Engine and Manufacturing Company, Handover, Pa. A heavy cast iron base, mounted on truck wheels, supports the light steel superstructure carrying the hook, chain and drum. Because of the heavy base and light upper structure, the center of gravity is very low, preventing top-heaviness, and permitting a high lift. The U-shape of the base allows the crane to be placed in any desired position about the car, and is narrow enough to pass between the wheels of a car. Prices are: No. 66, 1-ton, 6½-foot lift, 33-inch overhang, \$64; No. 76, 1-ton, 7-foot lift, 33-inch overhang, \$66; No. 80, 2-ton, 7½-foot lift, \$82.

Gas Saving Device.

The Auto Gas Saver Co., 29 S. La Salle St., Chicago, is marketing a device known as the vapo humidifier, which is designed both to save gasoline and do away with carbon. The device consists of an attachment which goes onto the intake manifold containing a valve regulated by a control accessible to the driver. Water vapor from the radiator is fed through a flexible tube from the top of the radiator, through the valve and thence into the motor. The price complete is \$5.



Hour-glass shaped alloy pistons

Ryerson connecting rod and bearing set for Fords

Manufacture Gasoline from Natural Gas

Thousand Cubic Feet Yields 4 Gallons of Distillate by Pressure Treatment

By C. L. von Berg

WITH the price of gasoline a subject of debate, it will be interesting to the many owners of motor cars and internal combustion engines to know the progress that has been made in the manufacture of gasoline from natural gas.

As far back as the fall of 1904 there were two successful plants of this kind in Pennsylvania. They were owned by private parties and naturally were very crude compared to some of the more modern ones. This first method may be called a low-pressure one. William Richards, Warren, Pa., claims to have been the first to install the high-pressure system, as in 1905 he used a pressure of 400 pounds to the square inch. This may not mean much to the layman, but to those mechanics who have for many years dealt with pressures, even those around 100 to 150 pounds per square inch, know what this means.

The condensation in these plants was effected by air and by water dripping over the pipes.

At this writing there are plants located in California, Oklahoma, Pennsylvania, West Virginia, and, in fact, in almost every oil and gas-producing locality. These are practically all owned by private parties or companies and their cost will run, according to their capacity, from about \$3,000 for a plant that will handle 120,000 cubic feet of gas in 24 hours, which includes a 15-horsepower gas engine in operation, up to one that will handle 600,000 to 700,000 cubic feet of gas, which will cost almost \$8,000. Buildings, foundations, pipelines, railroads, railroad-sidings, and storage-tanks, are not included in the estimates.

Investigations Conducted

While the United States bureau of mines has not taken up the installation of these plants, it has during the last year conducted a series of investigations with a view of reducing the waste and placing them on a more economic basis. To this end tests have been made in almost every plant now operating in the United States. This will prove of great benefit to the owners, making the business pay better dividends and at the same time furnish many thousands of gallons of gasoline annually that otherwise would be wasted.

Such tests would cost the average owner too much, even if it were possible to get men who were competent enough to make them. Right here is where the government can step in, sparing no pains to get accurate data and having men and instruments to insure this.

It has been found that the extraction

of gasoline from natural gas only tends to reduce the fuel value of the gas in a slight degree. The gas is again returned to the pipe-lines for the uses it was formerly put to.

Considering this fact, and the further saving of "casing head gas" and that escaping from gushers, all of which would otherwise be wasted if it were not turned to the making of gasoline, the advantages of these plants is readily seen. In remote localities where more gas is present than is needed, and as the bulk of it would make the transporting it to market impossible, to turn it into gasoline is the proper solution.

To describe in full one of these plants and its working would be far too technical for the average reader, who is naturally more interested in knowing that these plants exist and that much progress is being made both in the number of them and in the means resorted to for improving them.

Three Processes in Use

There are three processes now in use. The most common one consists in compressing the gas to a certain pressure, then cooling it by means of water or air. The second method is simply in cooling the gas, as with liquid ammonia. The last is a combination of the other two.

It has been found that about 4 gallons of gasoline can be made from 1,000 cubic feet of gas, and no doubt this amount will be greatly increased with the improvements found necessary, as each plant may have difficulties of its own to overcome, and entirely different from another located elsewhere, or, possibly, very close to it.

In that part of the oil field lying east of the Mississippi river, which no doubt comprises the largest field in the United States, there were, late in 1913, about 250 plants where the industry is well established.

Taking into consideration that a number of plants of good size which had been established by men having ample capital to make a success of them, but who did not have the knowledge that was needed, which caused them to fail, no small amount of harm has been done to the industry.

Natural gas is of two kinds, "dry" gas and "wet" gas, and proper tests must be made to determine the equipment necessary for the plant to handle it.

There is considerable danger of fire in these plants, especially where—as in most cases—electric lights, dynamos and switches are installed in the same buildings.

Excessive pressure on tanks has also been the cause of fires.

In the matter of transportation of gasoline made from natural gas, there has been a number of difficulties to overcome. "Weathering" and blending it with naphtha has proved very successful. This "weathering" process was a wasteful one and often from sixty to seventy per cent was lost, but by blending with naphtha, a liquid with a slower rate of evaporation is obtained.

The last year's report of the bureau of mines, shows that the number of plants in that year, over the preceding one, had been increased fully 100 per cent and if the cost of gasoline remains high there is no good reason why we should not have another large increase.

Economy in Fuel Necessary

In the meantime the purchasers of gas engines and motor cars should select the engine or the car that can, by actual tests, prove its superiority over all others in the economic use of gasoline and oil. The first cost becomes a secondary condition and too much dependence on the claims of the maker, not be resorted to. Then, too, many motors can make a fair economic showing the first few months, but it is what they will do afterward that we are most interested in.

The writer is indebted to the officials of the bureau of mines for much of the information and data in this article. Those who care to go deeper into the subject should write to the superintendent of public documents, Government Printing Office, Washington, D. C., and ask the price of Bulletin No. 88, which covers the subject fully.

EXPORTS INCREASE 35 PER CENT

Washington, D. C., Aug. 4—The exports of motor cars during the fiscal year ended June 30, 1916, reached the enormous total of 77,496 machines, valued at \$97,464,381, together with parts, not including engines and tires, to the value of \$22,536,485, according to figures compiled by the Department of Commerce. During the fiscal year the exports were classified as follows: Commercial cars, 21,265, valued at \$56,805,548; passenger cars, 56,231, valued at \$40,658,833. During the fiscal year of 1915 there were 37,876 machines exported, the value being \$60,254,635, the exports consisting of 13,996 commercial cars, valued at \$39,140,682, and 23,880 passenger cars, valued at \$21,113,953.

While the year's totals mounted high the figures show a decided falling off during June last as compared with the same month of last year. During June last 1,416 commercial cars, valued at \$3,551,148; and 4,905 passenger cars, valued at \$3,416,396 were shipped abroad, together with parts, not including engines and tires, to the value of \$1,886,746. In June a year ago, the exports consisted of 2,990 commercial cars, valued at \$8,578,802, and 4,418 passenger cars, valued at \$4,785,998.



Among the Makers and Dealers



BOWER Declares Dividend—The Bower Roller Bearing Co., at its directors' meeting declared a 15 per cent cash dividend, as the regular quarterly dividend.

Australia Head at Overland—Frank R. Kern, who for several years has been connected with the export department of the Willys-Overland Co., for the last year as factory representative in Australia, has returned for a brief stay at the factory.

Instructor Goes to Packard—Frank G. Kane, formerly head of the department of journalism at the University of Washington, Seattle, has left that institution to take up new duties in the advertising and publicity department of the Packard Motor Car Co. in Detroit.

Texas Oldsmobile Dealers—The S. G. Davis Motor Car Co., Dallas, Tex., has been organized to control the sales and service departments of the Oldsmobile company in 109 counties of Texas. Show rooms have been opened occupying 15,000 square feet of floor space. A complete line of parts will be carried.

Lee Secretary Dealers' Association—Robert E. Lee was elected secretary of the Automobile Manufacturers and Dealers' Association of St. Louis by the unanimous vote of the directors. Mr. Lee was the organizer of the association and served 5 years as secretary, resigning October, 1914, because of other duties.

Los Angeles Dealer Adds—The Chevrolet Sales Co., which formerly handled the retail sales of the Chevrolet in the city of Los Angeles only, became distributor of the line in Los Angeles, Orange, San Bernardino and Riverside counties. The contract of the firm calls for the distribution of 2,500 cars in the four counties for the coming season.

Branch Plant for Boone—The Boone Tire & Rubber Co., Des Moines, Ia., has practically concluded negotiations with the Business Men's Association to establish a branch plant in Beloit, Wis., to cost \$25,000. The Iowa company is capitalized at \$500,000 and operates a large tire and rubber works at Des Moines.

State Fair Show in Oregon—Motor car dealers throughout the state of Oregon will again exhibit at the state fair at Salem, Ore., which this year will be held September 25 to 30. Joseph M. Rieg, who managed the two previous exhibitions given in connection with the state fair, will again manage the show.

Texas Dealers Meet—Overland dealers from all parts of Texas were in Dallas this week to inspect the new Overland models and to discuss in detail business conditions in Texas. Two business sessions of the dealers were held each day. General ideas on salesmanship were discussed. The visitors were guests at luncheon of President W. W. Taxis of the Overland Co. of Texas. These meetings are held each year.

Union Truck Elects Officers—At a meeting of stockholders and others interested in the new Union Truck Co., Bay City, Mich., directors and officers were elected. James R. Tanner is president of the company; H. E. Woodworth, vice-president and general manager; E. C. Tibbetts, secretary, and George Beaulier, treasurer. These officers and H. E. Buck, W. H. Boutell and C. E. Chatfield form the directorate. The plant formerly occupied by the Marine Iron Works, Water and Second streets, has been secured and the Union truck is to be made there on a large

scale. It is said that the new concern has ample capital.

Continental Truck to Build—The Continental Motor Truck Co., Superior, Wis., expects to break ground August 1 for its new \$50,000 factory. The shop is to be ready November 1, at which time the output of trucks will be largely increased.

Ford Branch in Toledo—The Ford Motor Co., of Detroit has acquired a two-story building at Toledo, O., where a branch sales room was opened August 1. W. Barclay Deyo will be the manager with K. D. Sheldon assistant manager.

New Maker of Pauldings—H. A. Woerman, under the name Anchor Auto Co., St. Louis, has purchased the business of the St. Louis Motor Truck Co. He will continue to manufacture Paulding trucks and will also give service to present owners of these vehicles.

Four Wheel Dealers—The Four Wheel Drive Auto Co., of Clintonville, Wis., manufacturers of the F. W. D. Truck, has just closed with Victor L. Phillips, Seventh & Delaware streets, Kansas City, Mo., to represent the company in that territory.

Adams Trucks No More—The Adams Truck, Foundry & Machine Co., of this city, which 2 years ago changed its name to the above from that of the Adams Bros. Co., has discontinued the manufacture of Adams commercial vehicles, to concentrate on foundry and machine shop work.

Wilson Body Co. Bought—The Detroit Weatherproof Body Co., which was organized last year, with a capital stock of \$10,000, has taken over the business of the C. R. Wilson Body Co., and has reorganized. Its capital stock is now \$750,000. The company will specialize in making the Detroit top, which is a detachable, convertible, all-year-around limousine top of medium price, and which embodies a number of special features covered by patents controlled by the company.

To Build Engines and Tractors—The Rotary Gas Engine & Pulverizer Co., which was organized recently at Antigo, Wis., with \$25,000 capital, intends to engage at once in the manufacture of rotary gas and steam engines and tractors, gearsets for motor cars, and other mechanical devices. The designing is done by Clarence Rishel, Denver, Colo., who has come to Antigo to take charge of the manufacture. For the present the production will be done under contract with local machine shops and foundries.

Lee Tire Declares Dividends—The Lee Tire & Rubber Corp. has declared its regular quarterly dividend of 50 cents per share and an extra dividend of 25 cents, both payable September 1 to stock of records August 15. The payment was the initial dividend of 3 months ago. It is reported that net earnings for the first 6 months of 1916 amounted to approximately \$300,000 or twice the amount required for dividends. The company's new factory for miscellaneous rubber business is nearly completed and operations will begin early in August.

Times Square at Des Moines—The Times Square Co., has opened an accessory distributing house at Des Moines, Ia., with Manager Froelich in charge. This is one of a chain of branches being established over the country by the Times Square concern.

Southern Apperson Distributors—Hart Bros., Dallas motor car distributors, have closed a contract whereby they will represent the Apperson Automobile Co. in Texas,

New Mexico, Louisiana, Oklahoma and Arizona.

Victor Rubber Increases Capital—The Victor Rubber Co., Springfield, O., has voted an increase of the capital stock from \$300,000 to \$750,000. This increase was found necessary to provide facilities for taking care of the rapidly increasing business on their new pneumatic tire, production of which will soon be doubled.

Apperson Distributors in Southwest—Hart Bros., Dallas, Tex., have closed a contract with the Apperson Automobile Co., whereby they will represent them in the entire Southwest. Their territory includes Texas, Oklahoma, Louisiana, New Mexico and part of Arizona. State and divisional dealers are now to be appointed.

Vote on Victor Expansion—At a recent meeting of the board of directors of the Victor Rubber Co., Springfield, O., it was voted to increase the capital stock of the company from \$300,000 to \$750,000 in order to provide facilities to double the production of pneumatic tires. A 100 per cent stock dividend on the common stock was declared, this having been made possible by the company's earnings last year.

Denby Branch at Des Moines—The Denby Motor Truck Co., of Detroit, Mich., has opened a branch house in Des Moines, Ia. C. F. Morphew, Kansas City, made the preliminary arrangements and has now moved to Des Moines to make his home and to manage the local branch which will be the distributing point for Denby trucks in Iowa and Nebraska. He plans to establish 100 or more agencies in the territory served by this branch.

Big Chalmers Increase—For the fiscal year 1916 which ended June 30, the Chalmers Motor Co.'s preliminary statement shows that the total assets are \$13,051,533.90, or \$4,857,274 more than a year ago. The company's surplus is more than double what it was last year, totaling \$2,066,673.88 as compared with \$1,010,422. Cash on hand was \$564,746.64 instead of \$1,173,135.

Elgin Increases Stock—Elgin Motor Car Corporation has increased its capital stock from \$1,000,000 to \$3,500,000.

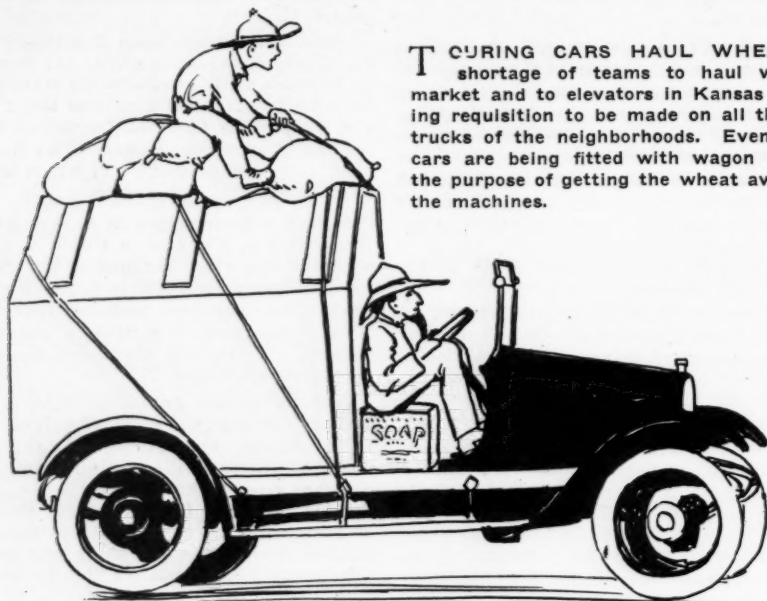
Associations to Unite—Steps are being taken to hold a meeting of the Columbus Garage Owners' Association and the Columbus Automobile Trade Association in the near future for the purpose of perfecting plans for the merger of the two organizations. It is planned to merge the associations under the latter name, to affiliate with the Ohio Automobile Trade Association and to take vigorous steps to bring all dealers, garagemen, tire salesmen and repairmen into the organization.

Lima Overland Distributors—The Lima-Overland Company has been made distributor for the Overland in Lima, O., and surrounding counties. In order to take care of the increased volume of business the capital has been increased to \$50,000. The concern has also acquired new quarters on West Market street for its sales room and service station. George Bayly is president; Samuel Roeder, vice president and E. R. Lindesmith, secretary-treasurer.

Saxons in Aurora—The Saxon Motor Sales Co. has been appointed distributor of the Saxon line in southern California and Arizona. The territory controlled by the company consisted of southern California only, in the past.



From the Four Winds



TOURING CARS HAUL WHEAT—The shortage of teams to haul wheat to market and to elevators in Kansas is causing requisition to be made on all the motor trucks of the neighborhoods. Even touring cars are being fitted with wagon beds for the purpose of getting the wheat away from the machines.

N. E. L. A. Has Picnic—The annual picnic of the Chicago branch of the Electric Vehicle Section of the N. E. L. A. took place at Ravinia Park August 10.

World's Largest Car—The world's largest motor car, having a carrying capacity of 25 tons, has been built for transporting wool across country in Australia.

Touring in Ozarks—Motor car touring in the Ozarks has more than doubled since last summer, according to reports from that scenic region of the middle west. The increased travel is due, in the opinion of St. Louis automobile men, to the publicity given road improvement in the Ozark district.

Washington's New Roads—By October 1st the permanent highway appropriation made by the 1915 legislature will have been expended and the map of the State of Washington will show 358 miles of new highways. The roads made possible by the last grant of the legislature are practically completed at present. With the finishing work on roads through the McClellan pass and along the Sunset highway almost complete, the work is practically at an end.

No Jitneys in Tacoma—From indications there will not be a single jitney bus in operation in Tacoma by July 1917. Already the number has dwindled, until only 25 cars are now authorized to carry passengers in this city. Recently the bonding companies raised the premium rates on jitney buses to \$250. This means that the average jitney would have to pay nearly \$1 a day on its state bond, not considering the city license fee, the increasing cost of gasoline and the steady wear and tear of tires.

Roads to Alaska—Highway development has extended to Alaska. The road leading out of Skagway is to receive the immediate attention of the Alaska road commission. Roads leading out of Juneau are to be improved and extended. The portage road on Prince of Wales island will come in for its share of betterment, as will the roads leading to Sitka. Recent developments in the Porcupine district make a substantial road necessary. To the westward the Valdez-Fairbanks road will be the chief center of interest. The cost for this improvement has been provided for by congress. It is

estimated that it will cost \$800 per mile to construct. It will cover a distance of 400 miles.

Washington Chamber to Meet—Definite arrangements have been completed for the holding of the second annual convention of the Washington Automobile Chamber of Commerce in Tacoma, Wash., scheduled this year for August 4, preceding the Montanamarathon races.

No Ad Signs in Washington—The Washington state highway commission is experiencing much annoyance by private firms posting advertising on signs along the state highways. The practice is against the laws of the state of Washington. The state highways have been well marked and all vandalism of these highway signs will be prosecuted to the fullest extent.

Burlington Way Campaign—St. Louis car owners, especially those who have summer homes in the Lake states, are showing considerable interest in the Burlington Way campaign and a delegation went to Medora, Ill., in a body to attend the barbecue there,

Coming Motor Events

TRACTOR DEMONSTRATIONS

Aug. 7-11—Fremont, Neb.
Aug. 14-18—Cedar Rapids, Ia.
Aug. 21-25—Bloomington, Ill.
Aug. 28-Sept. 1—Indianapolis, Ind.
Sept. 4-8—Madison, Wis.

SHOWS

September 4-8—Hartford, Conn.
September (date undecided)—Cleveland.
September 25-30—Salem, Ore.
October 14-31—Dallas, Tex.
January 6-13—New York show.
January 13-20—Montreal.
January 27-February 3—Chicago show.
March 3-10—Boston.

The Show Circuit

Atlantic City Show—Beginning Monday, August 7, Atlantic City is holding its first automobile show, on Young's pier. Many of the exhibitors are from Philadelphia, but dealers from other cities will participate.

Salem, Ore., Show—Motor car dealers throughout the state of Oregon will again exhibit at the state fair at Salem, which, this year, will be held September 25 to 30.

at which Homer J. Tice, author of Illinois good roads laws, was the chief speaker. This road propaganda will open the way to Burlington, Ia., from this city, with roads to Springfield, Ill., and other points to which local motorists drive. Eventually the path will be extended to St. Paul.

Pathfinder Tour—Samuel Plant, chairman of the tours committee of Automobile Club of St. Louis, announces that the pathfinding tour to Keokuk, Ia., where is located the Mississippi power dam, was so satisfactory that he regards it as settled that the annual reliability tour will be made to that point. The present plan is to start the tour early on September 21.

Club Moves Offices—Directors of the Louisville Automobile Club voted Monday to remove the headquarters of the organization from the Inter-Southern Building to the tenth floor of The Seelbach. The change was decided upon mainly because of the desirability of having the club offices more easily accessible to tourists stopping in the city. The club will have a suite at the west end of the hotel's top floor. Secretary Eugene Stuart plans to move before September 1.

Elaborate Private Garage—Albert O. Trostel, millionaire Milwaukee tanner, has been granted a permit to build a \$35,000 garage and conservatory at his palatial residence, 850 Lake Drive, Milwaukee. It will be one of the finest private garages in the country and embody complete green and hot houses.

105,000 Cars in Texas—According to an estimate of the Dallas Automobile Club, the state of Texas June 1 this year had in actual use and operation a total of 105,000 cars, an increase of fifteen thousand since January 1. These statistics are compiled once each year and are believed to be about correct.

Motor Buses in St. Louis—The city of St. Louis will go into the automobile bus business next week when one double deck and two single deck buses are delivered for service in Forest Park. All of the buses are of special design, built on Packard truck chassis by the St. Louis Car Co. They have a total passenger capacity of 104 persons. A route has been laid out in the park of more than 1,000 acres. The fare will be five cents for a continuous trip, which passes the art museum, zoo, principal lakes and athletic grounds and the main street car terminals. The establishment of this transportation line ends a long fight by private interests to obtain bus or street car franchises for the park.